

Honeywell

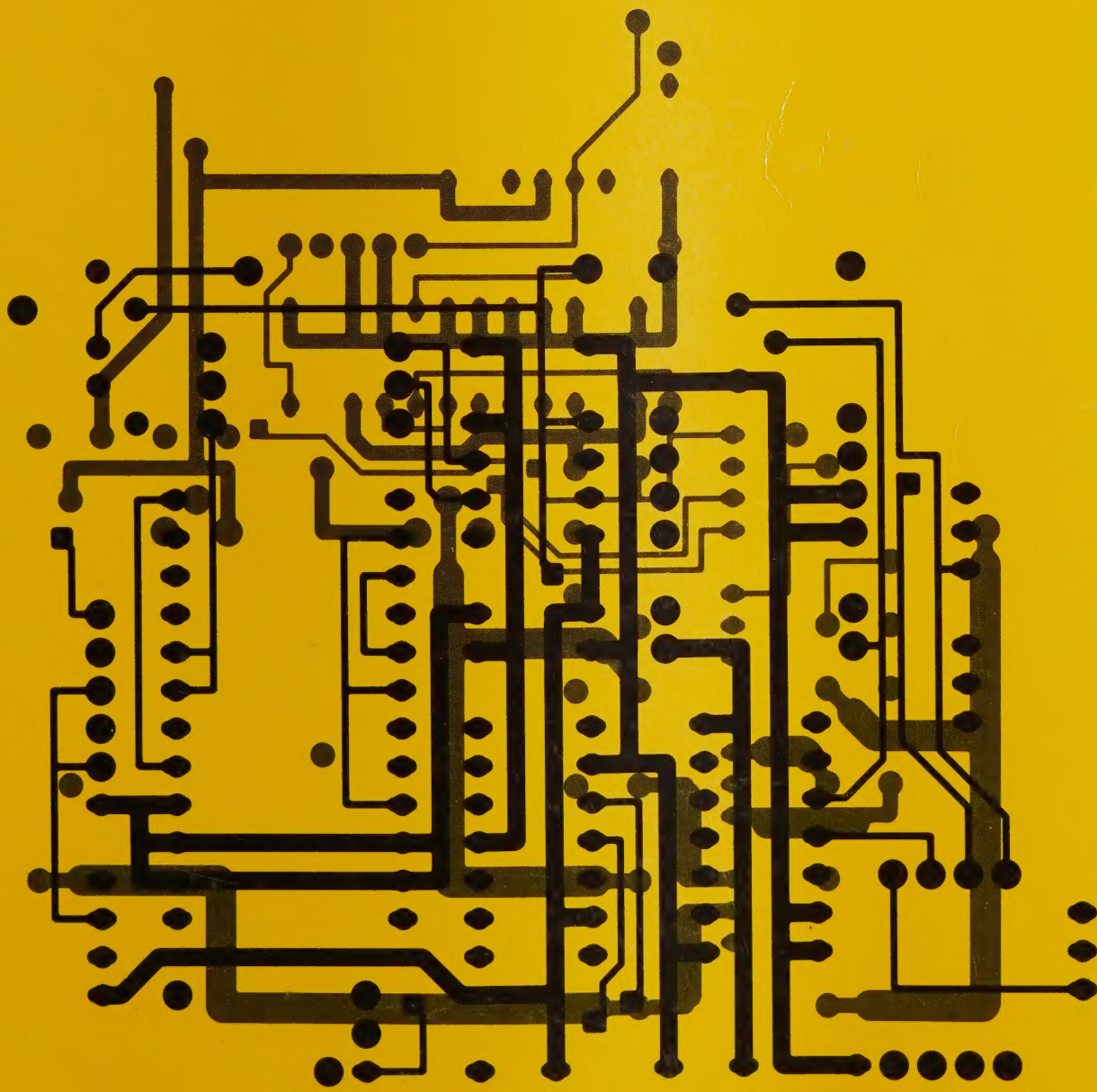
Operator's Manual

11234281-53020-53020-00-00000-103-32

Elektronik

F300-091

111/112



Important notice

The device described herein has been manufactured and tested for correct operation and conformance to our published specifications and is warranted to perform as advertised.

Should your instrument require recalibration after a period of time, you will find instructions covering this procedure in the appropriate section of this manual.

Recalibration, unless required because of a defective component or workmanship, is considered a normal maintenance function.

Replacement of components and assemblies, where examination indicates the normal recommended maintenance practices, described herein, have not been followed, may not be covered by your warranty. In addition, expendable items such as pens, ink pads, slidewire contactor, relay contacts and other components of a similar nature are not normally covered by warranty unless examination reveals that replacement or repair is necessitated due to faulty workmanship or components.

Should you have any questions relative to your warranty, please contact your nearest Honeywell office or write to the Director of Quality Assurance, Honeywell, Fort Washington, Pennsylvania 19034.

For Training . . .

. . . Honeywell's Educational Services Center in Fort Washington, Pennsylvania offers maintenance and operator training courses on all Process Control Division product lines. Experienced full-time instructors conduct the courses using the products in simulated process applications for realistic hands-on experiences.

Besides the regularly scheduled courses, we can design customized courses to meet specific training requirements. All courses can be conducted at your site.

A brochure containing course descriptions, class schedules, registration information and tuition fees is available on request from:

Honeywell Educational Services
1100 Virginia Drive
Fort Washington, PA 19034
Attn: Registrar
Phone: (215) 641-3032

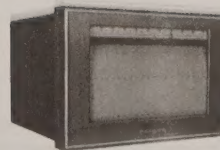
For the record . . .

. . . be sure to use Honeywell recording accessories (See back cover for further details.)

Charts

Pens

Inks



ELEKTRONIK ONE-TWELVE TWO PEN RECORDER



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With this OPERATOR'S MANUAL we are supplying a book specific to this one instrument and containing a minimum of extraneous data about all the other thousands of variations in the ElectroniK 111/112 product line. To do this we have sectionalized not only the text within this book, but also the Table of Contents.

In general, the TYPE OF DATA listed in the column on the right side of this page is indexed by the numbers in the margins of all the odd numbered pages.

The PORTION OF THE INSTRUMENT is indexed through separate Tables of Contents sections:

BASIC INSTRUMENT CHASSIS	101-
Portions fundamental to the model indicated	
ENCLOSURE	102-
Door, case, etc.	
MEASURING SYSTEM (if not included in the	103-
101 section)	
Measuring circuit, constant voltage unit	
BALANCING SYSTEM (if not included in the	104-
101 section)	
Slidewire, servo amplifier, servomotor	
INDICATION & RECORDING (that not	105-
already in the 101 section)	
Pens, print carriage, etc.	
CONTROL, if any (may be more than one	106-
section)	
Set point, error signal generator, control	
units, etc.	
NON-CONTROL OUTPUT, if any	107-
Backset switches, transmitting elec. or pneu.	
signal, etc.	
OPTIONS, if any	108-
Any variations not covered by above categories	

SPECIAL INSTRUMENTS

When an instrument is provided with non-standard parts, or non-standard combination of standard parts, a SUPPLEMENTARY DATA section is added to the front of this manual. In such a case, even if a wiring diagram or instruction section is listed in one of the Tables of Contents, it may be omitted or replaced by a substitute. The model number of these special instruments are usually preceded by the letter "Y." The SERVICE MANUAL does not normally cover the special portions of these instruments.

DESCRIPTION 1
What you have: location of components, basic functions of components.

INSTALLATION 2
How to mount and connect

OPERATION 3
How to make it run; where to turn on, adjust; change chart, pen, ink ribbon, etc.

MAINTENANCE 4
How to keep it running: cleaning, lubrication, calibration, accessibility to components

NOTE:

THEORY	5
(How it runs),	
SERVICE	6
(What to do when it stops), and	
SCHEMATICS	8
are available in a separate SERVICE MANUAL, which may be purchased upon request (see order blank at end of this manual). There may be some references in this OPERATOR'S MANUAL to sections of the 5XX or 6XX series which are located in the SERVICE MANUAL.	

PARTS LIST 7
Which parts are available; orientation aid.

DRAWINGS 8
Dimension drawings, connection diagrams, wiring diagrams

You will notice this book is composed of many sections which are selected according to the options and variations on your specific instrument. Our only key to the assembly of this book, as well as the manufacture of your instrument is the COMPLETE model number.

PLEASE INCLUDE THE FULL MODEL NUMBER ALONG WITH THE SERIAL NUMBER WHENEVER YOU WRITE US CONCERNING YOUR INSTRUMENT.

Section

012-6

MARGINAL INDEX

DESCRIPTION

Basic functions; Specifications
Location of Components

111-322
112-124

1

INSTALLATION

Shield connections

224-5

2

OPERATION

Basic instrument adjustments

311-215

3

MAINTENANCE

Access to servo package

431-8

4

SERVICE

To order service manual

990-1

6

PARTS LIST

Orientation of sub-assemblies
Drawbridge
Sub-chassis
Chart transport
Side plates and chart drive

711-171
715-53
716-82
752-36
753-23

7

DRAWINGS

899-36

8

K: 1123XXXX
1124XXXX
1127XXXX

TABLE OF CONTENTS

This enclosure is used with recorders having an integrally mounted proportional control unit mounted vertically on the left side. It is also used with other recorders prepared for relay rack mounting (usually a blank plate covers the left side of the door).

Section

INSTALLATION Enclosure

212-47

PARTS LIST Enclosure

714-69

DRAWINGS Dimension

30703310

K: 112XXXX1
112XXXX2

TABLE OF CONTENTS

Section

DESCRIPTION

See section 112 for location of measuring circuit
and constant voltage units.

1

OPERATION

See section 311 for adjustment of span and
zero.

3

MAINTENANCE

Calibration preparation
Calibration procedures

422-12
424-1

See section 431 for access to measuring circuit
and constant voltage units.

4

PARTS LIST

See section 731 for part numbers of measuring
circuit and constant voltage units.

TABLE OF CONTENTS

Section

DESCRIPTION

See section 112 for location of slidewire, amplifier, measuring circuit, constant voltage unit, servo motor.

1

OPERATION

See section 311 for adjustment of gain.

3

MAINTENANCE

Slidewire access, cleaning

For access to servo package components (amplifier, measuring circuit, constant voltage unit) see section 431.

446-1

4

PARTS LIST

Servo amplifier case assembly

Amplifier

Servo motor

See section 716 for servo slidewire.

731-9

742-40

749-8

7

I-II: 41XXX to 43XXX
46XXX, 47XXX
51XXX to 53XXX
56XXX, 57XXX
61XXX to 63XXX
56XXX, 67XXX

TABLE OF CONTENTS

	Section
This option is also used on instruments with set-point drives	184-6

DESCRIPTION
Discussion and location of components

1

PARTS LIST
Included in Chassis Ass'y
Section 716

7

DRAWINGS
Internal wiring diagram

30750414

8

VII: 090
091
II: 0013X
0014X
0025X
0026X
4209X
4210X
4227X
4308X
4310X
4327X

ELECTRONIK 111/112
ONE/TWO CARTRIDGE-
PEN STRIP CHART

Section 105-142, Issue 2

	Section
DESCRIPTION	
Strip chart components	153-22
INSTALLATION	
Connection and mounting	222-12
OPERATION	
Chart transport, changing chart, gears	353-4
Pen lifter, ink cartridges	354-32
MAINTENANCE	
Checks and procedures	411-103
Lubrication points	453-6
PARTS LIST	
Fibre Tip Pen and Carriage	754-30
See also 752 and 753 sections	

NOTE: This instrument is supplied with cartridge type fiber tip marking assemblies.
Ignore all reference to capillary type pen systems which may appear in this manual.

105-0142-110

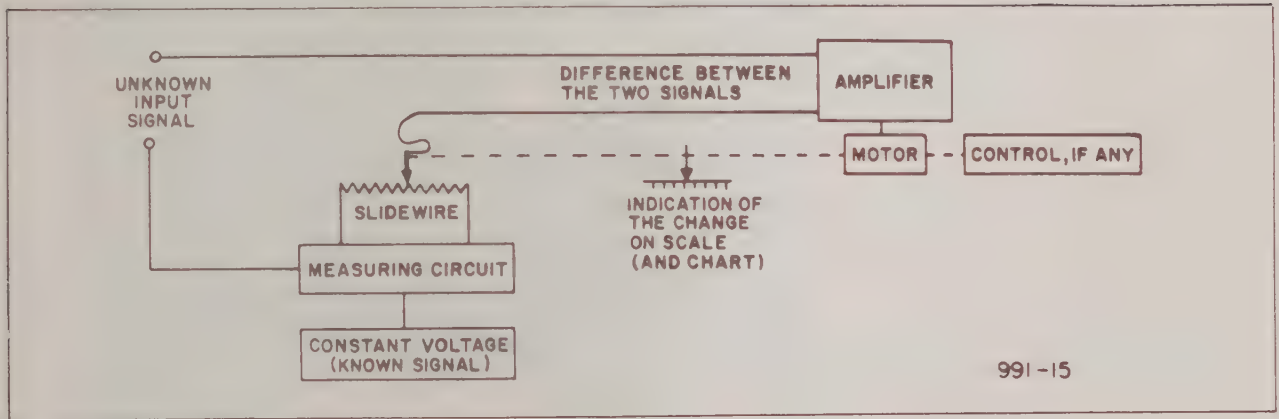
TABLE OF CONTENTS

	Section
DESCRIPTION	
Strip chart components	153-24
INSTALLATION	
Connection and mounting	222-12
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Chart transport, changing chart, gears	353-4
Pen lifter, ink cartridges	354-32
MAINTENANCE	
Checks and procedures	411-103
Lubrication points	453-6
PARTS LIST	
Fibre tip pen and carriage	754-30
DRAWINGS	
Customer connection	30702950
Internal wiring diagram	30750402

K: 1123X22X
1123X28X

WHAT YOU HAVE

This ElectroniK* instrument is an automatic null balance servo potentiometer. Used in conjunction with many types of primary elements, it automatically measures the magnitude of a variable by comparing the input signal from the primary element with a feedback signal from the measuring circuit and automatically repositions an indicating or writing device in response to input changes, to maintain a condition of electrical balance.



The servo system includes components that translate the input signal into an indication of the value of the measured variable:

- Slidewire develops feedback signal.
- Constant Voltage Unit provides reference signal.
- Measuring Circuit compares the two and produces an error signal.
- Amplifier circuit that converts the d-c error signal into an a-c signal and amplifies that signal to drive the servo motor.
- Servo motor that develops the torque to reposition the slidewire and rebalance the system.
- Drive cable that translates the rotary motion of the servo motor into the motion of the indicator and/or writing device.

A more thorough explanation is in the THEORY portion of service manual 11-02-01, beginning with section 511.

Rated Performance Specifications

Accuracy

Single Range or two pen recorder

Spans 5 millivolts and above: $\pm (0.3 + 0.1 \times \text{suppression ratio}) \% \text{ of span}$
(or 0.020 millivolts, whichever is greater).

Spans less than 5 millivolts: $\pm (0.3 + 0.1 \times \text{suppression ratio}) \% \text{ of span} + 0.005 \text{ millivolts}$.

Dual Range Recorders

Type J, K, T, E or W5W26, thermocouple input:

$\pm (0.35 \pm 0.05 \times \text{Suppression Ratio}) \% \text{ of span}$

or

$\pm (4.5 \pm 0.05 \times \text{Suppression Ratio}) \% \text{ of span}$
span (mv)

whichever is greater

Type R, S Thermocouple input or ma, mv:

$\pm (0.35 \pm 0.05 \times \text{Suppression Ratio}) \% \text{ of span}$

or

$\pm (3.0 \pm 0.05 \times \text{Suppression Ratio}) \% \text{ of span}$
span (mv)

whichever is greater

Reproducibility (24-hour)

Typically less than $\pm 0.15\%$ of Span.

Deadband

0.15% of Span.

Source Resistance Rating

For zero offset no greater than 1/2 deadband on millivolt and thermocouple spans; 10K ohms maximum on spans less than 5 mv, or balance speed of 1 second full scale. 2K ohms maximum on spans 5 mv or greater, or balance speeds of 5 or 15 seconds full scale.

Off Balance Input Resistance

Single range or two pen recorder

40K ohms minimum on spans less than 5 mv, or pen speed of 1 second full scale.

300K ohms minimum on spans 5 mv or greater, or pen speeds of 5 or 15 seconds full scale.

Dual Range Recorders

$\geq 25 \text{ m ohms}$ with spans $\leq 100 \text{ mv}$

$\geq 20 \text{ K ohms}$ with spans $\geq 100 \text{ mv}$

Interference (stray) Rejection

Normal Mode (Transverse):

60 Hz: 0.5 x span

50 Hz: 0.2 x span

Common Mode (Longitudinal):

60 Hz: To 120 volts RMS

50 Hz: To 50 volts RMS

DC: 240 x span to 240 volts maximum.

OPERATING CONDITIONS

Temperature

Rated: 59° to 104° F (15° to 40° C).

Extreme: 16° to 140° F (−9° to 60° C).

Humidity

Rated: 10% to 90% RH.

Extreme: 5% to 90% RH (400 gains per lb. dry air max.).

Vibration and Shock

Rated: To 70Hz and 0.1 G (1 G shock).

Extreme: To 200 Hz and 0.2 G (5 G shock).

Position (tilt)

To 15 degrees forward, to 45 degrees backward.

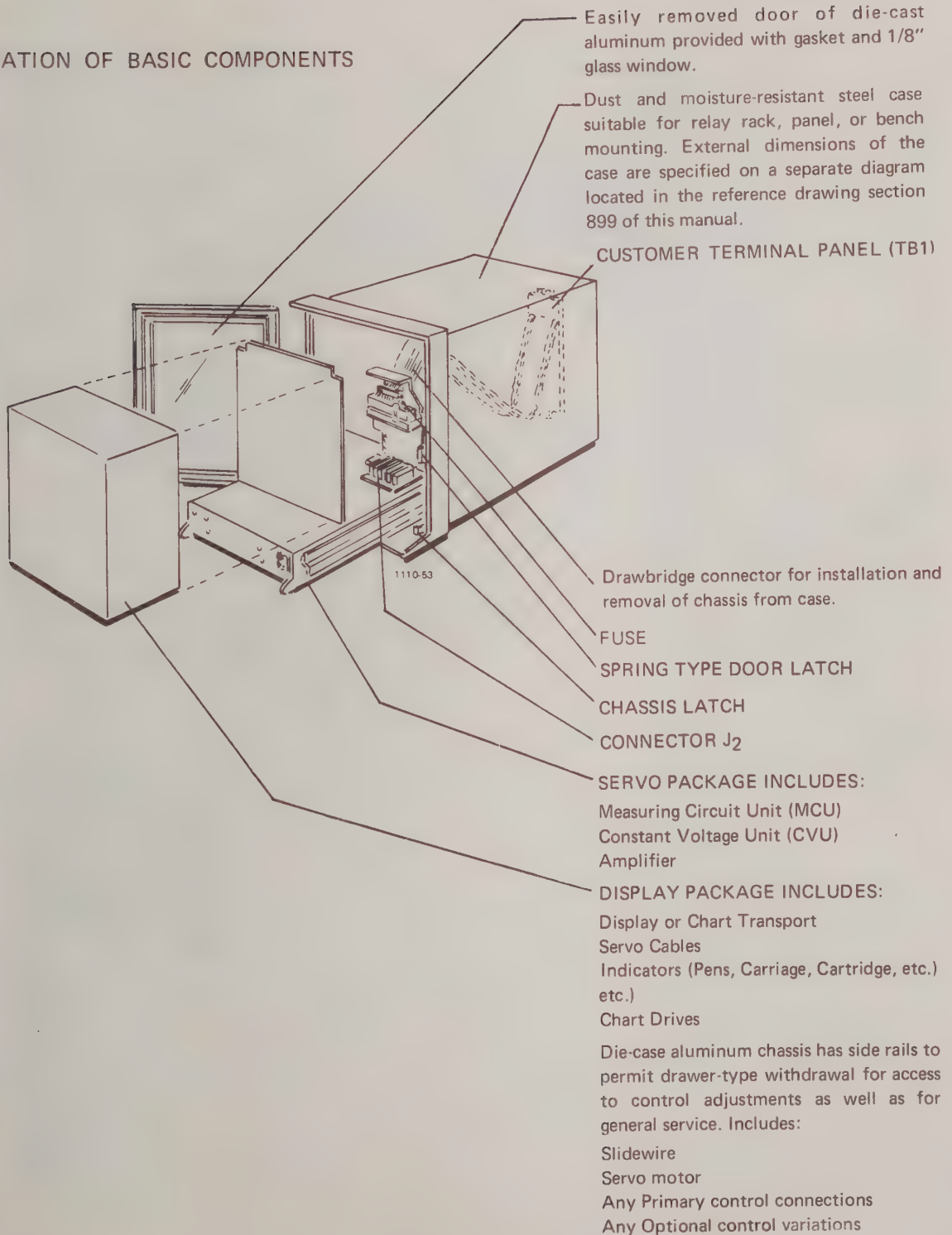
Power Requirements

Rated: 110 to 125 volts ac, 60 Hz (50 Hz optional).

Extreme: 100 to 130 volts ac.

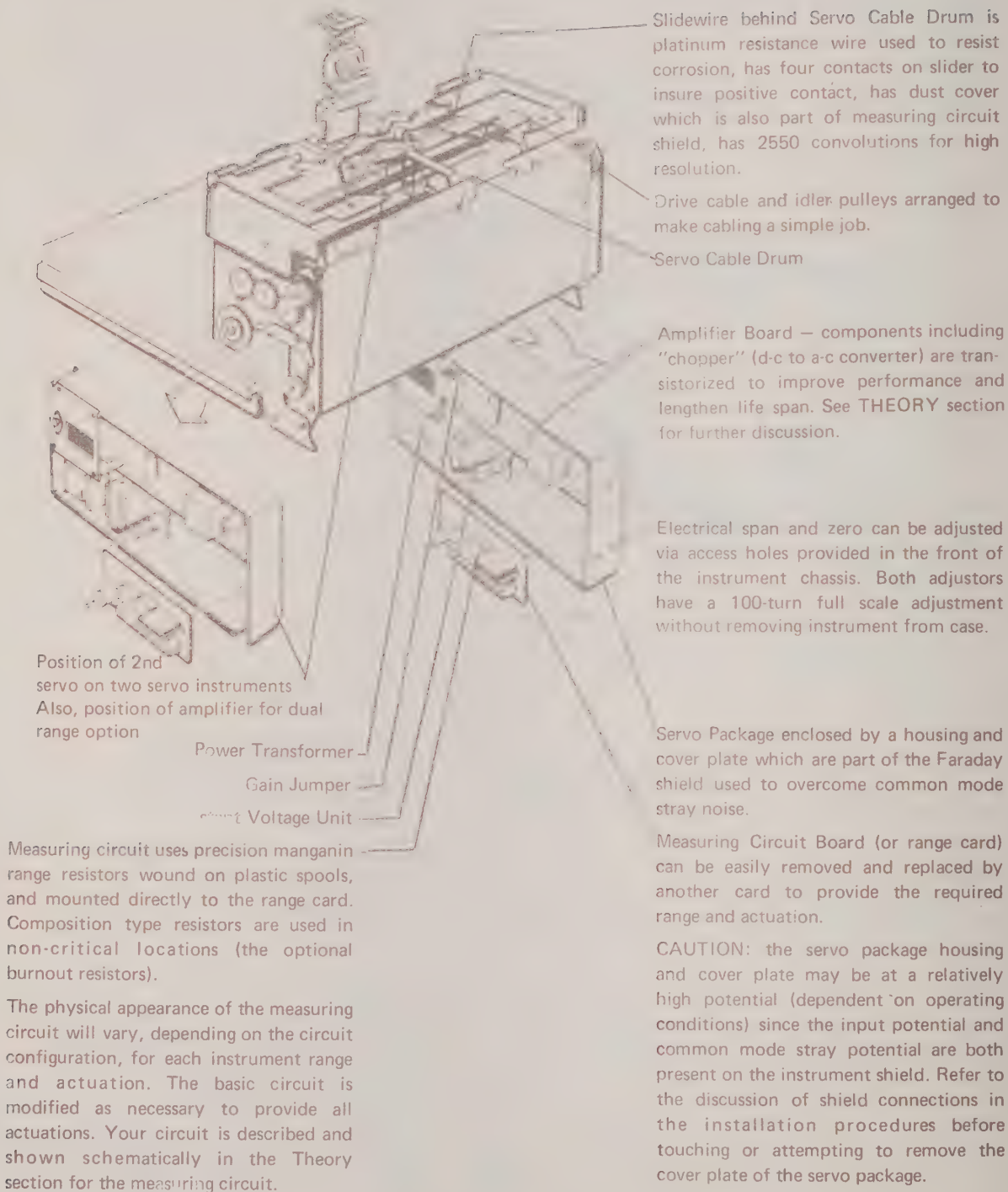
Instrument rated performance meets or exceeds requirements of American National Standards Institute (formerly American Standards Association) specification C39.4 1966 for electronic potentiometers.

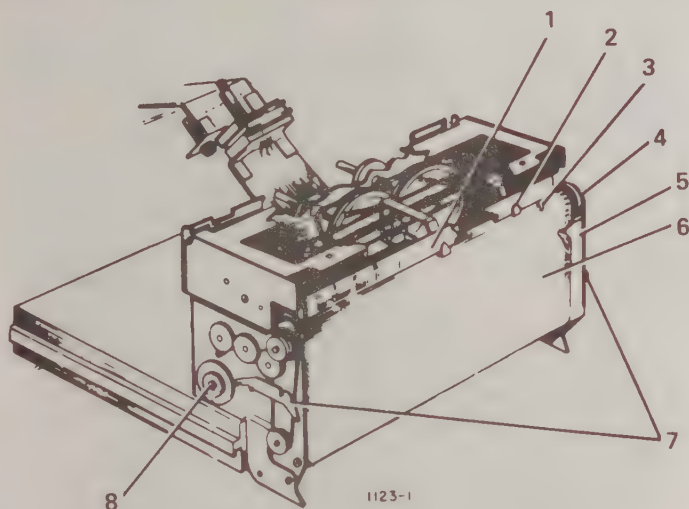
LOCATION OF BASIC COMPONENTS



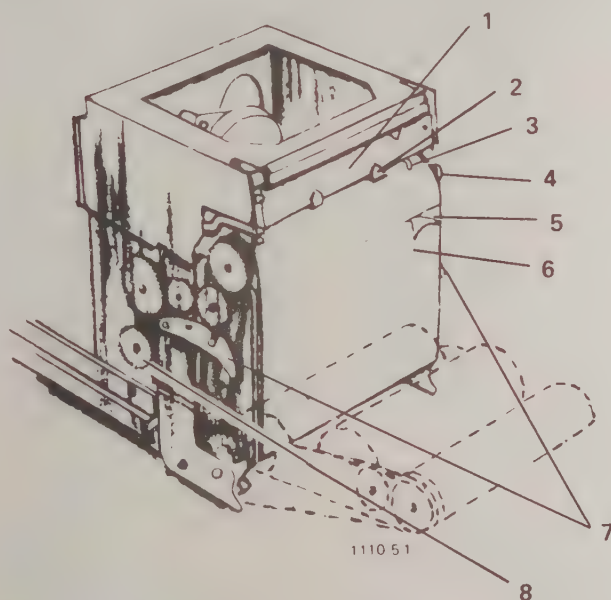
1

BASIC ONE-TWELVE DESCRIPTION





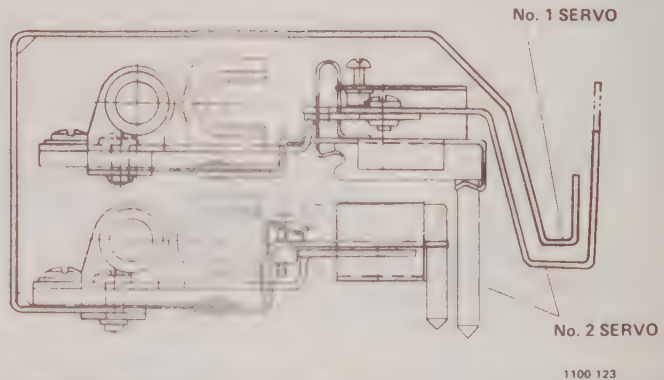
- 1 Calibrated width of chart and scale is 152,4 mm (6") on Class 111 instruments, and 279,4 mm (11") on Class 112 instruments; length is 122 feet. (Equivalent to 30 days of chart at 2 inches an hour). Length of chart record visible through window in door is 6 inches. Expansion and contraction in chart width will not exceed an average of 1% from 10 to 85% relative humidity change.
- 2 Indicator and replaceable fiber tipped recording cartridge.
- 3 Event Pen Option mechanically restricts servo and pen carriage to 95% full scale travel. If this option is provided, further discussion can be found in EVENT PEN OPERATION section 356 (index 3).
- 4 Manual Chart Advance
- 5 Chart Tear-off
- 6 Chart transport is designed so that the chart can be advanced or loaded without withdrawing the chassis from the case. Chart loading does not interfere with the instrument operation as an indicator or controller. The chart transport is hinged at the bottom, and pivots forward for chart loading. Chart transport is removable to permit preloading spare transport for a faster change.
- 7 Chart transport Release Latches.
- 8 Change gears are provided (attached to left side plate) to vary the chart speed 1/2 or 2 times the basic speed.



PEN TYPE 111/112 RECORDERS
DESCRIPTION

Section 153-22

Orientation of pens on two servo variations.



Design of the carriage and cable attachment is such that there is no error introduced in the reading of the pointer on the scale due to clearance in the pen carriage bearings.

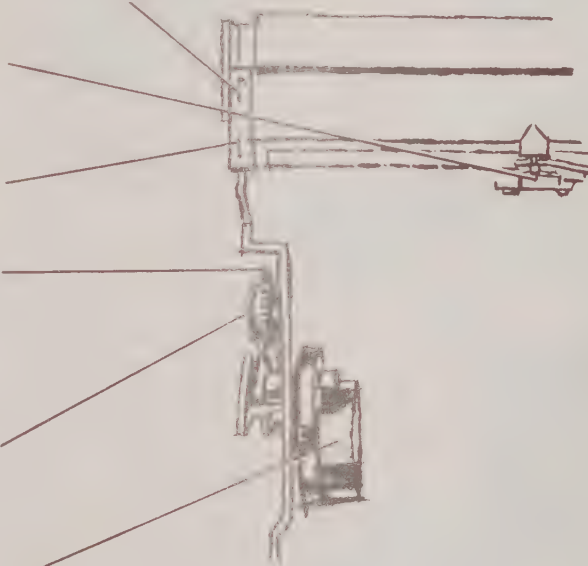
Manual pen lifters also have automatic pen lifting action when chart transport release is pushed to drop chart transport for service or loading. #2 servo is over #1 servo.

Special shaped teeth are provided on the idlers where the gear train is separated to lower the chart transport for loading. This is to insure proper re-engagement when transport is again raised.

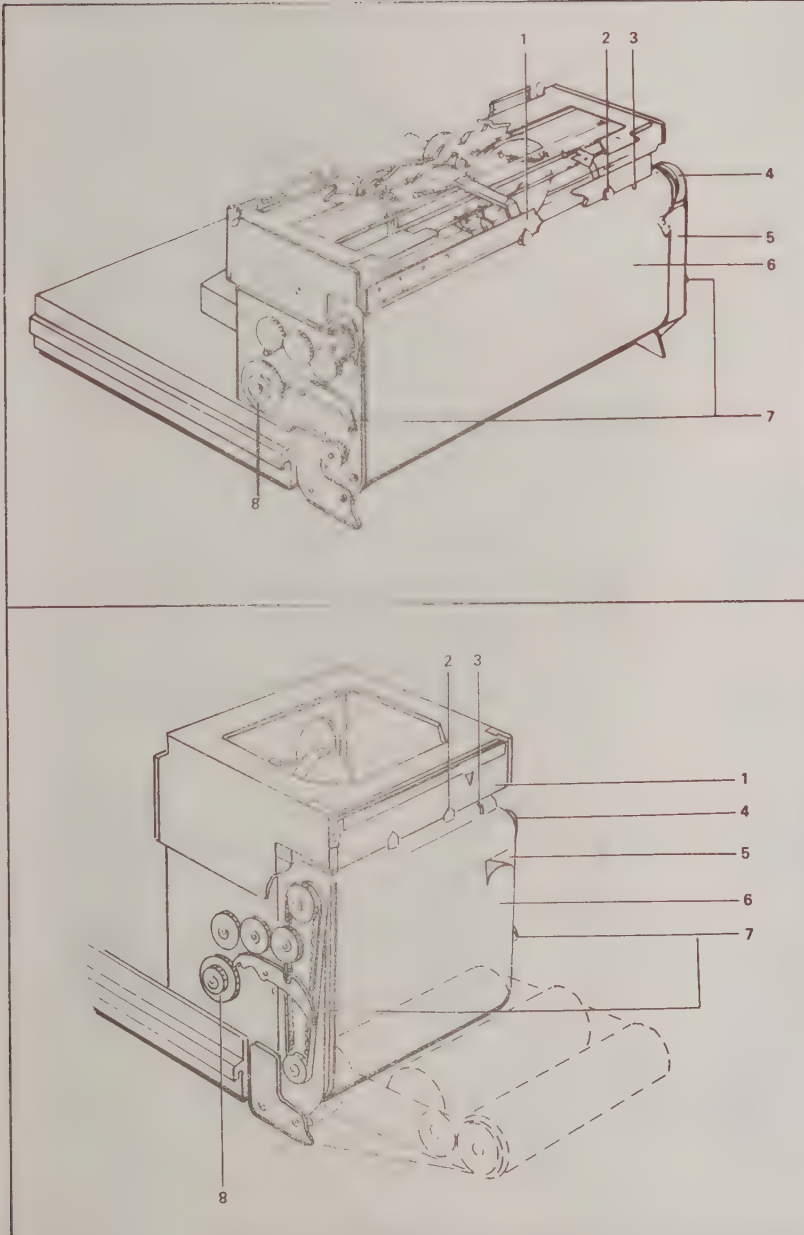
Chart drive gear train designed with anti-reversing spring in the system which allows easy positive adjustment of chart to a time line, and also reduces backlash in gear train. Time for chart to begin motion after motor is started is equivalent of 0.062" of chart length.

Basic chart speed can be altered by substitution of various synchronous chart motors.

#2 SERVO
PEN LIFTER



153-0022-110

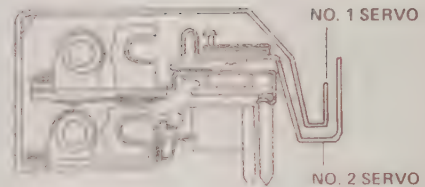


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- 7 Chart transport Release Latches.
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PEN TYPE 111/112 RECORDERS
DESCRIPTION

Section 153-24

Orientation of pens on two servo variations.



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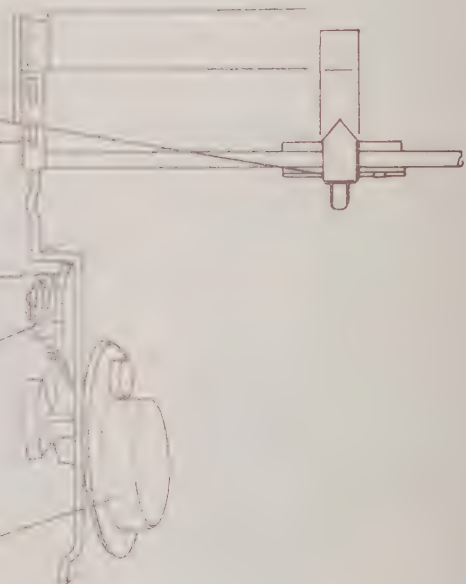
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Special shaped teeth are provided on the idlers where the gear train is separated to lower the chart transport for loading. This is to insure proper re-engagement when transport is again raised.

Chart drive gear train designed with anti-reversing spring in the system which allows easy positive adjustment of chart to a time line, and also reduces backlash in gear train. Time for chart to begin motion after motor is started is equivalent of 0.062" of chart length.

Basic chart speed can be altered by substitution of various synchronous chart motors.

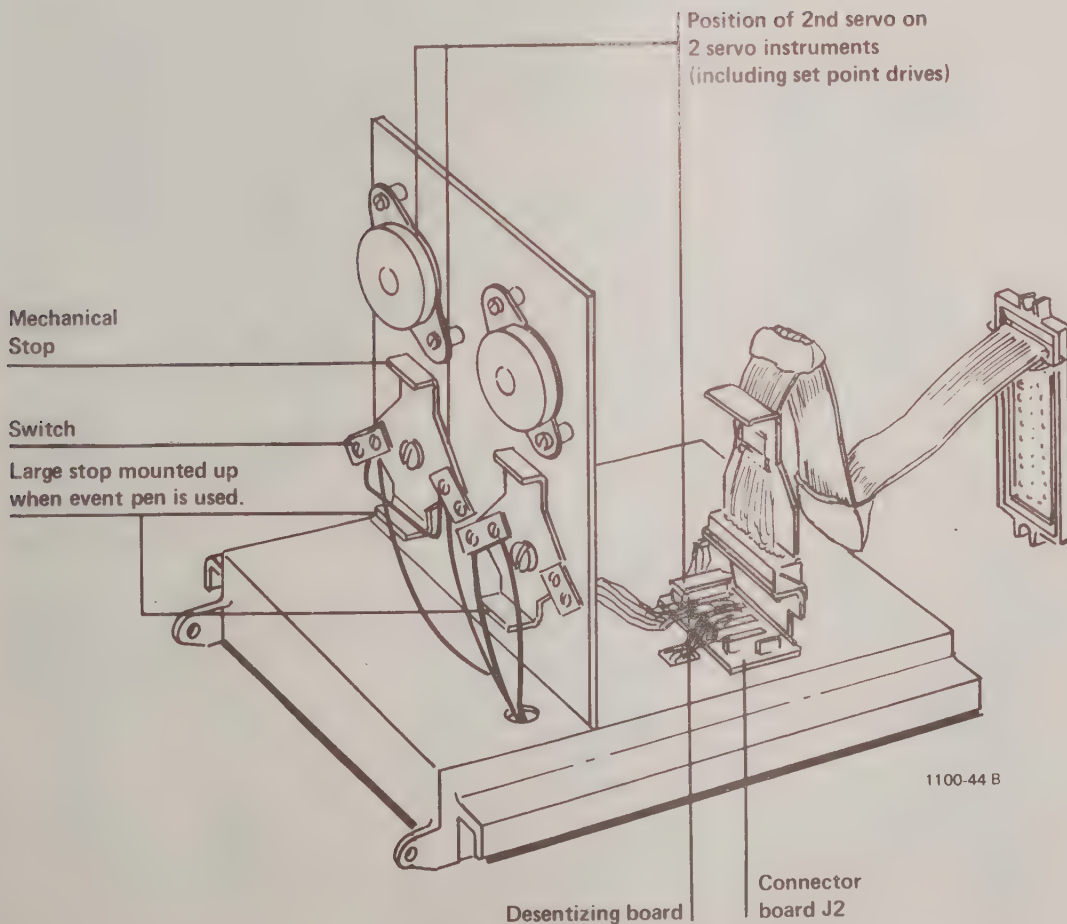
NO. 2 SERVO
PEN LIFTER



DESENSITIZING SUPPRESSED RANGES

An added feature to this instrument is desensitizing between 1 and 3% of scale and between 97 and 99% of scale.

Densensitizing is accomplished by using a servo drive gear stop pin to actuate a MICRO SWITCH encapsulated snap-switch before striking the mechanical stop at the extreme end of travel. When this switch is actuated, a resistor is switched in series with the servo motor control winding, causing the motor to be desensitized. Note the wiring diagram in the DRAWINGS portion of this manual.

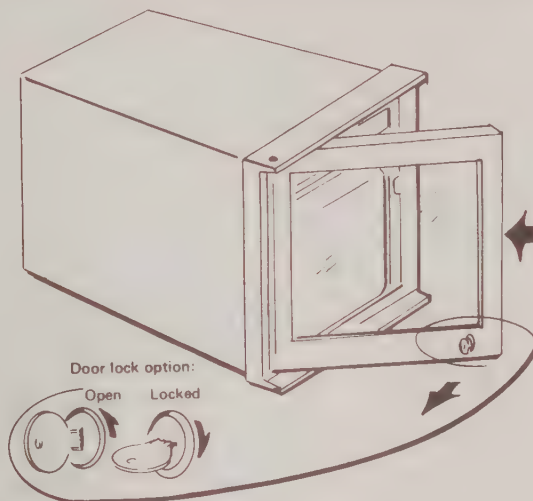


TO OPEN INSTRUMENT

A spring catch is located on right side of door.

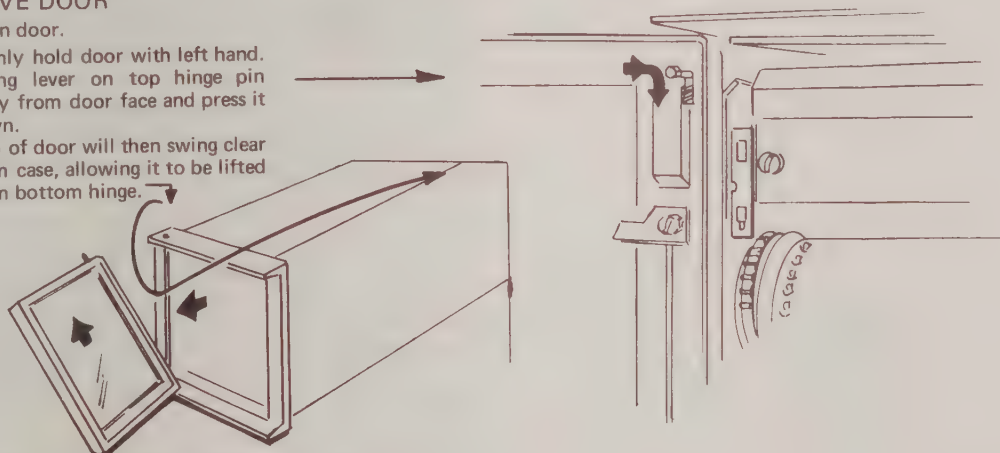
Press fingers firmly against right edge of door and pull forward.

Door swings open to the left.



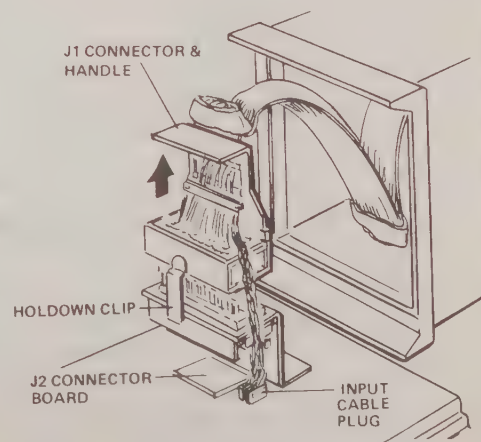
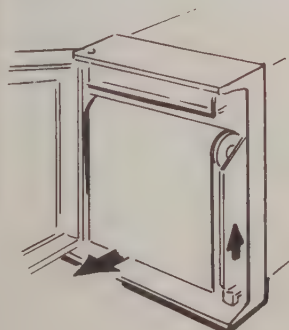
TO REMOVE DOOR

1. Open door.
2. Firmly hold door with left hand.
3. Swing lever on top hinge pin away from door face and press it down.
4. Top of door will then swing clear from case, allowing it to be lifted from bottom hinge.



TO REMOVE CHASSIS

1. Lift release latch, grasp platen, and slide chassis forward. Release latch. Latch will lock chassis in extended position. If instrument has just been unpacked, a strip of cardboard at top of chassis may offer resistance.
2. Disconnect terminal block on drawbridge by first removing input cable plug from J2 PCB, release holdown clip and lift J1 connector handle.
3. If this is a pneumatic controller or transmitter see next page (which will be section 216) to disconnect pneumatic drawbridge connector before removing chassis in step 4.
4. Again lift release latch to slide chassis completely out of case.



SELECT LOCATION

Area

Select area which is as close as practicable to process variable.

Limitations

Ambient temperature of selected clean, dry area should not exceed recommended instrument limits of 58°F to 104°F. Extreme temperatures of 16°F to 140°F can be tolerated without failure, but accuracy could be degraded.

NOTE: Any ink used in pen type instruments will freeze at 15°F.

MOUNTING CASE

A mounting dimension drawing (in DRAWINGS section of this instruction) furnishes dimensions of enclosure. They are indexed in TABLE OF CONTENTS Section 102. Remove chassis from case before mounting case.

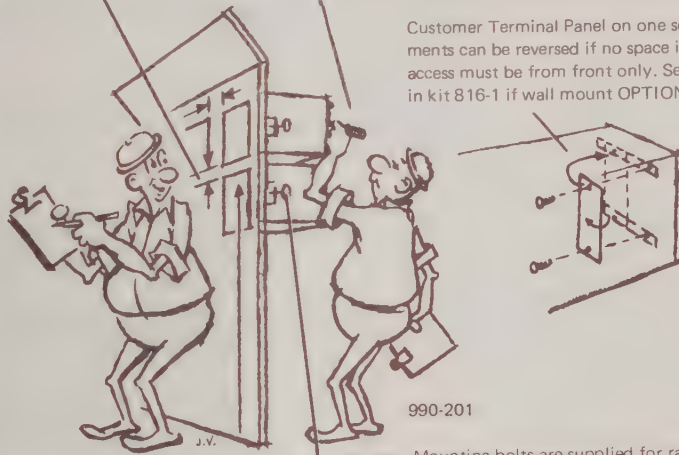
ELECTRICAL CONNECTIONS

An external wiring diagram for instrument shows external connections to customer terminal panel at rear of case. It is located in DRAWINGS section of this manual, and indexed in TABLE OF CONTENTS Section 105. For instruments with control, see also index in TABLE OF CONTENTS Section 106; for conductivity or pH/ORP actuations, see also index in TABLE OF CONTENTS Section 101. If 220/240 power OPTION is used, you will also find drawing 30703745.

Allow sufficient room to permit full extension and removal of chassis, as well as some clearance on both sides to open door. See Dimension Drawing.

Allow sufficient clearance at rear of instrument for access to all external electrical connections.

Customer Terminal Panel on one servo instruments can be reversed if no space is available and access must be from front only. See discussion in kit 816-1 if wall mount OPTION is requested.



990-201

In many situations a panel height of about 5 feet from floor provides best visibility.

Mounting bolts are supplied for rack or panel mounting. Support instrument and hand tighten screws, then use screwdriver to tighten ONE ADDITIONAL turn. Excessive torque could cause distortion.

No fixtures are required for bench mounting.

Customer's Terminal Panel TB1 (shown facing rear; can be also face inside)

Position of Customer's Terminal Panel on 2 Pen or dual range Versions TB2

Any control or other options requiring customer connections. See DRAWINGS section of this manual for wiring diagram for customer connections.

Power Input

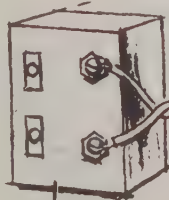
Connect Instrument Ground (GRD) separately and directly to a good earth ground.

Input from process variable (from primary element or sensor)

Backplate held by 6 screws

Normal shield connection (see section 224)

Remove chassis before opening Knockouts. Use grommets if conduit is not used.

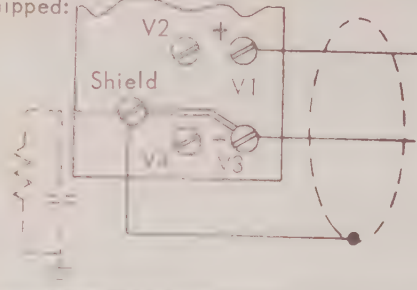
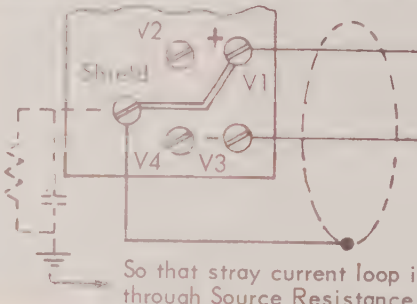
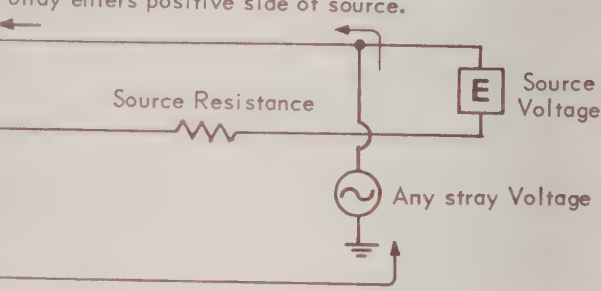
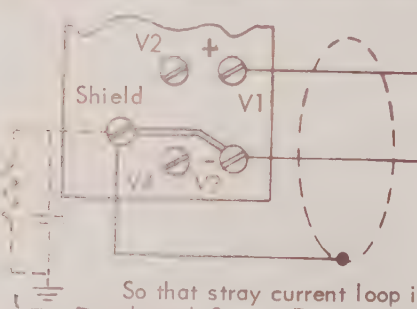
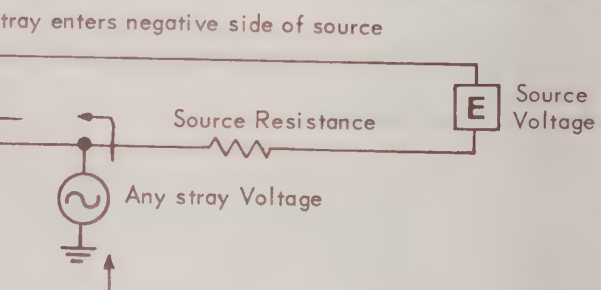
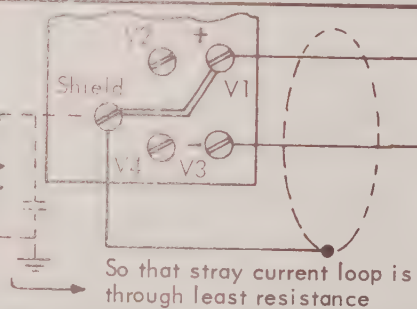
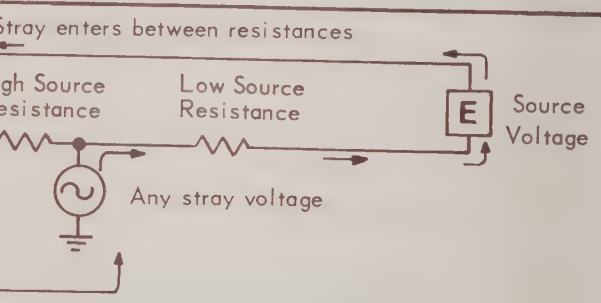
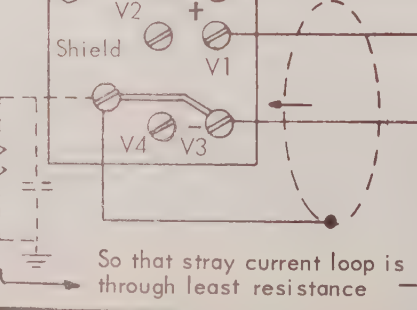
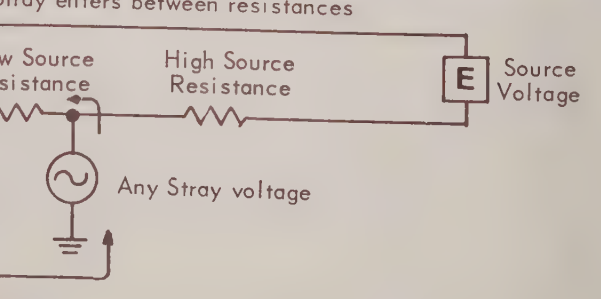


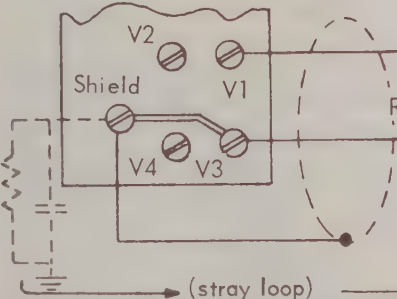
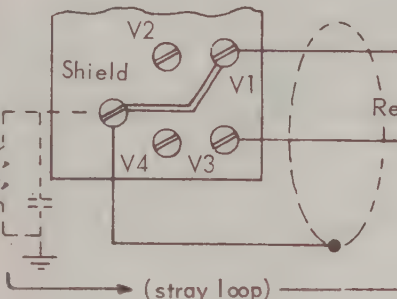
Reference Junction compensator for thermocouple actuations.

For controller connections, see also DRAWINGS Section of this manual.

Do not run signal input wiring with power wiring, especially not in the same conduit.

1100-96

4. CONNECTION REQUIRED	FOR THESE CONDITIONS
As shipped: 	Whenever source impedance or resistance is less than $200\ \Omega$, stray current will not affect instrument accuracy ratings. Above $200\ \Omega$, accuracy ratings are affected but can be minimized as shown in conditions below.
 So that stray current loop is not through Source Resistance	Stray enters positive side of source. 
 So that stray current loop is not through Source Resistance	Stray enters negative side of source 
 So that stray current loop is through least resistance	Stray enters between resistances 
 So that stray current loop is through least resistance	Stray enters between resistances 

CONNECTION REQUIRED	FOR THESE CONDITIONS
 (stray loop)	a-c stray enters between equal "resistances" Resistance A approximately equals Resistance B a-c Stray Voltage Source Voltage
 (stray loop)	d-c stray enters between equal "resistances" Resistance A approximately equals Resistance B d-c Stray Voltage Source Voltage
Try both, connect to the terminal that gives best results.	UNKNOWN

5. CONSIDERATIONS

- In this instrument d-c stray is more critical than a-c, especially in high temperature and high humidity ambients.
- Any stray voltage generated by d-c leakage through the signal source will be algebraically added to the input signal.
- Although this instrument has a "floating shield," there exist inevitable ground "leaks" that will complete a "ground-loop".
- Do not confuse "instrument-ground" (GRD) which ties the chassis to an earth connection (water-pipe-ground or earth-ground) with "signal-ground". We are defining "signal-ground" as "shield" and it should be floating fully insulated from "earth-ground." "SHIELD" is grounded only in IDEAL SITUATION, where Common Mode source can be grounded without adverse effects.

2

6. EXTREME PROBLEMS

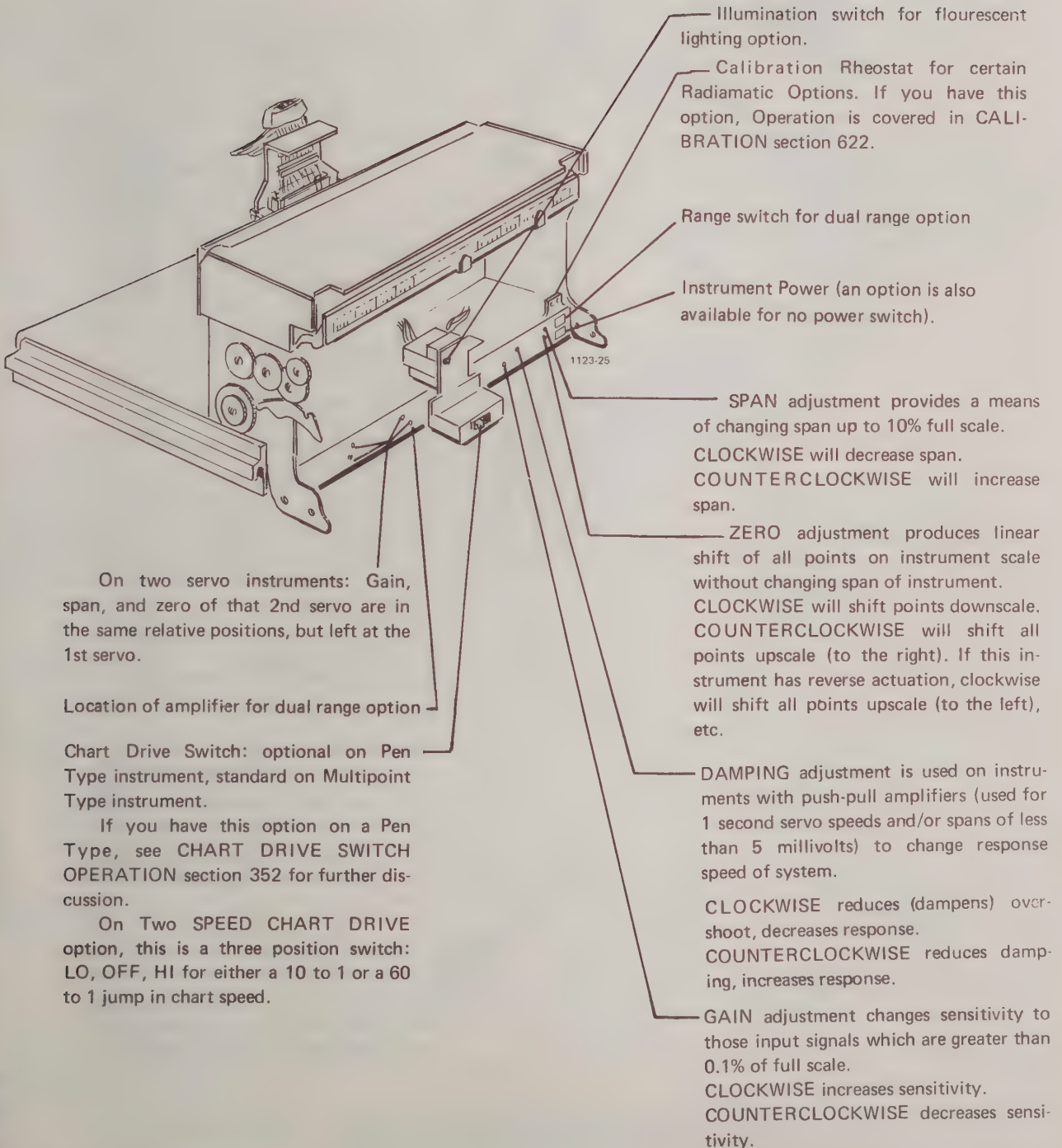
a. **FOR D-C STRAY.** Keep instrument ambient temperature down, and atmosphere dry, free of moisture, steam, and condensation.

b. **FOR A-C STRAY.** When shield terminal cannot be used effectively as shown above, try a capacitor across input terminals when there is source resistance to short-circuit a-c Normal Mode. A pair of back-to-back Tantalum capacitors are preferred by some. Experiments can be made with filter circuits at the input terminals using values in relation to the actual input signal and the magnitude of the stray.

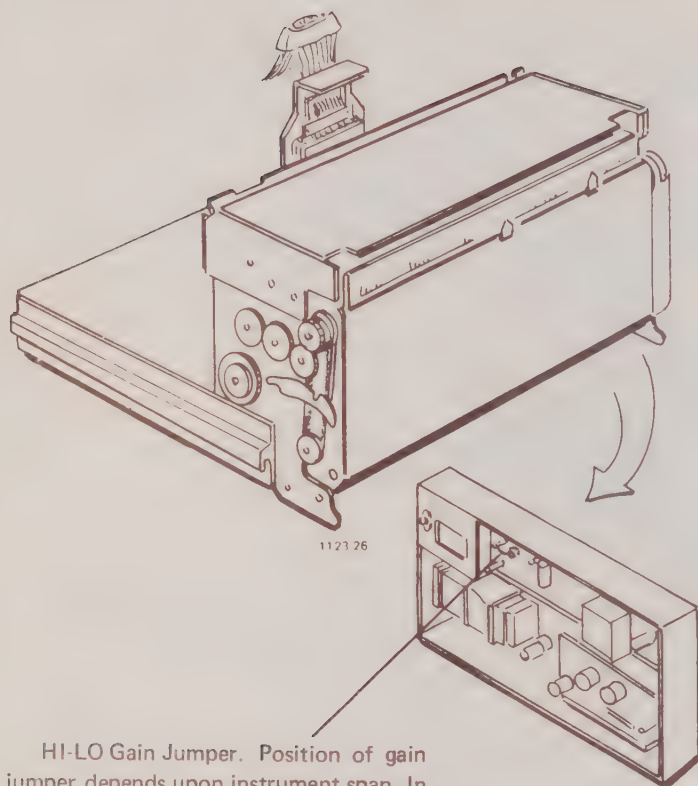
Remember that any components added to the input will affect the dynamics of the servo, generally slowing the balancing speed.

ELECTRICAL ADJUSTMENT AND SWITCHES

3



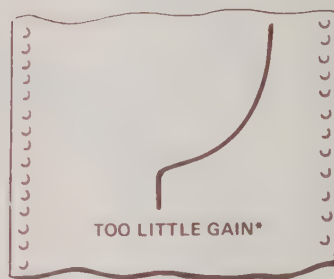
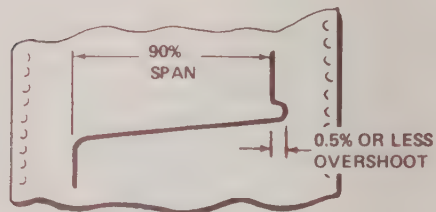
BASIC ONE-TWELVE OPERATION



HI-LO Gain Jumper. Position of gain jumper depends upon instrument span. In general, it should be connected to HI gain pin for an instrument span of less than 15 millivolts; and to LO gain pin for spans of more than 15 millivolts.

GAIN

Optimum gain setting should give minimum or no overshoot (0.5% or less) on a 90% full scale step change.



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WARM-UP TIME

Switch on instrument power and allow instrument to warm up for at least 30 minutes to stabilize internal temperature and insure measurements obtained are within calibrated accuracy of instrument.

SHUTDOWN

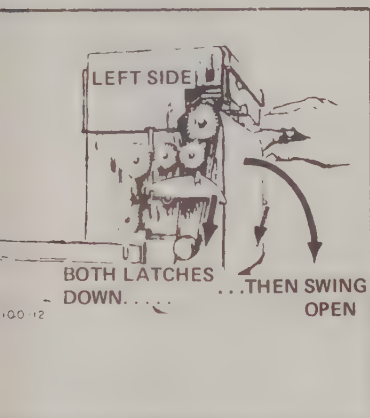
For Pen Type instruments which will be shut down for a week or more, drain ink supply and flush out ink system with water to prevent ink drying in system.

*Figure ignores any damping adjustment used on some models.

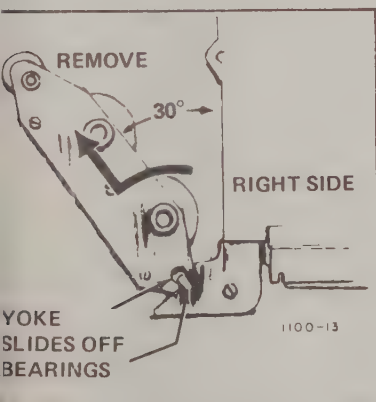
CHART TRANSPORT

Latch is located on each side of chassis.

TO "OPEN" TRANSPORT for chart loading, pull latch(es) down; transport is released and can swing forward 90°. Latching is automatic when transport is returned to position.



TO REMOVE TRANSPORT, drop it forward to about 30° from vertical and lift. REPLACE by sliding the two yokes over bearings while holding transport in the 30° position.



CHANGING THE CHART

Chart rolls are spring loaded to the left. Press rolls to the right to remove from or place into transport.

Chart paper feeds under the upper roll, over the entire platen, and over the lower paper roll. Transport need not be removed to change chart.

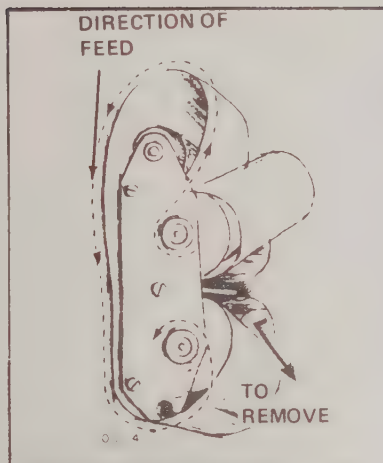
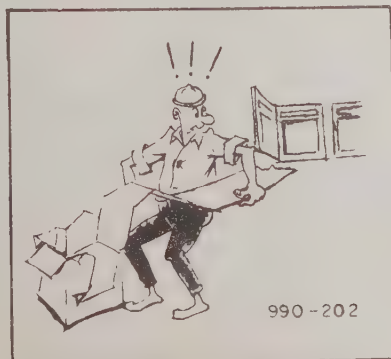


CHART SUPPLY INDICATOR

Standard chart rolls are supplied with the TATTLE-TRACK feature. This inconspicuous red printed trace starts approximately 2 feet from the beginning of a 6 inch wide (ELECTRONIK 111) chart roll at the right hand edge, and progresses diagonally across to the left-hand edge at the end of the chart. The position of the trace relative to 0-100% of scale gives the percent of chart remaining at any given time. On a 12 inch wide (ELECTRONIK 112) chart trace starts approximately 22 feet from the beginning of the roll at the LEFT edge, and progress diagonally across to the RIGHT edge at the end of the chart. The position of the trace relative to 0-100% of scale gives the percent of chart used at any given time. The trace is "feathered" so it cannot be confused with the record.



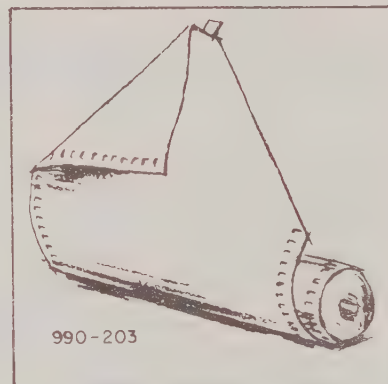
You may find it convenient to calculate the running time between chart change. In this way you can predict when the chart will run out, and avoid inopportune interruptions, or feel safe with overnight or weekend operation.

$$\text{running time} = \frac{\text{chart length (122 feet)}}{\text{chart speed}}$$

EXAMPLE: a chart will run 30 1/2 days at 2 inches per hour:

$$\frac{122 \text{ feet}}{2 \text{ inches}} \times \frac{1 \text{ foot}}{12 \text{ inches}} \times \frac{24 \text{ hours}}{1 \text{ day}} = 30.5 \text{ days}$$

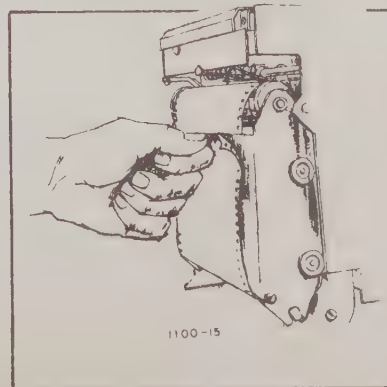
Some people prefer to cut or fold back the chart along the leading edge. This technique was originally intended for those instruments that require the chart to be fed through narrow slots. Some feel that the chart also rerolls better this way.



CONVENIENT CHART TEAR-OFF

Use any sharp edge (pencil point, screwdriver, etc.) across top edge of platen to quickly remove chart.

After tearing off chart, attach fresh edge to reroll tube, or hang a weight on the edge, otherwise chart may curl up over the pen or scale.



ELECTRONIK 111/112

STRIP CHART

OPERATION

CHART DRIVE GEARS

To change the speed of the chart drive, interchange the drive gears located on the left side of the chassis. A slot-head screw is used to retain the gears and make changing easier.

Alternate gears are bolted on that same side.

Position A	Position B	Speed
60T Gear	60T Gear	Basic *
80T Gear	40T Gear	2 x Basic
40T Gear	80T Gear	1/2 x Basic

*Basic speed is determined by the chart motor used, and listed in Display Parts List section 753.

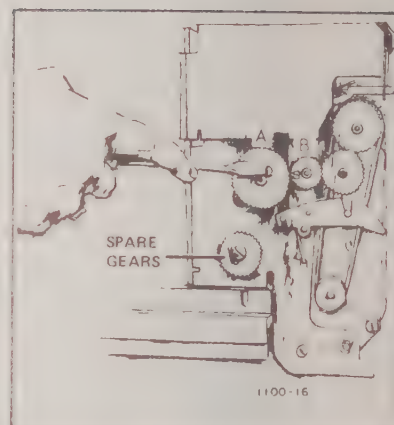
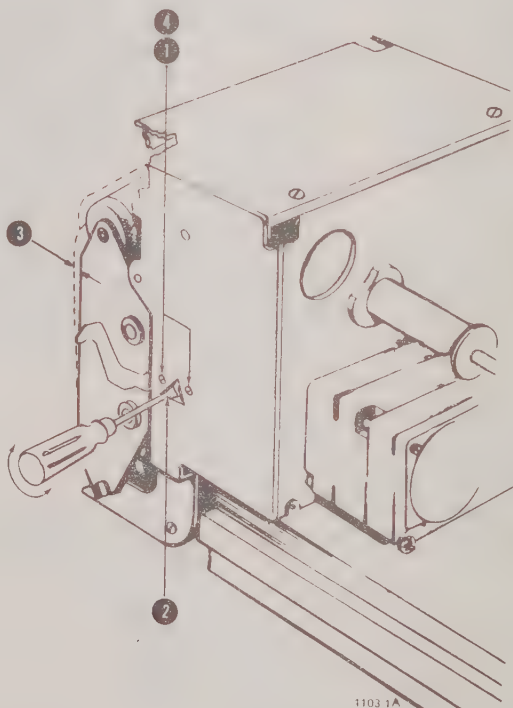


CHART MODULE ECCENTRIC ADJUSTMENT

If the chart time lines are not parallel with the pen travel (a condition sometimes identified by the clarity of the pen trace from one side of the chart to the other), the chart module eccentric adjustment needs correcting.

PROCEDURE

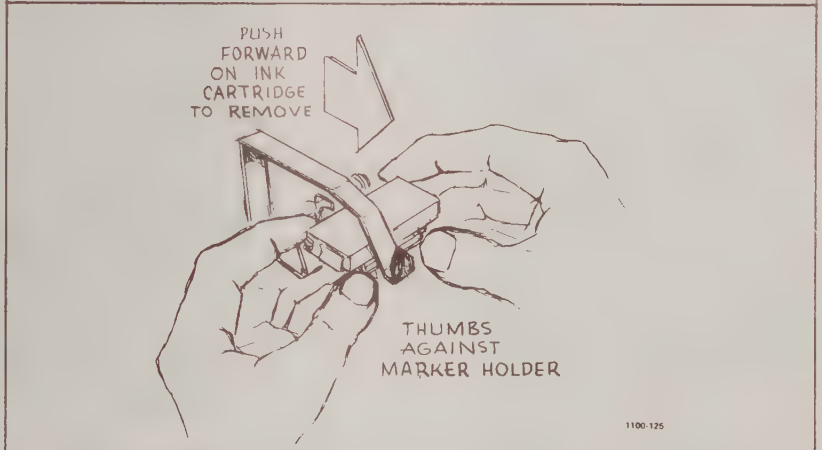
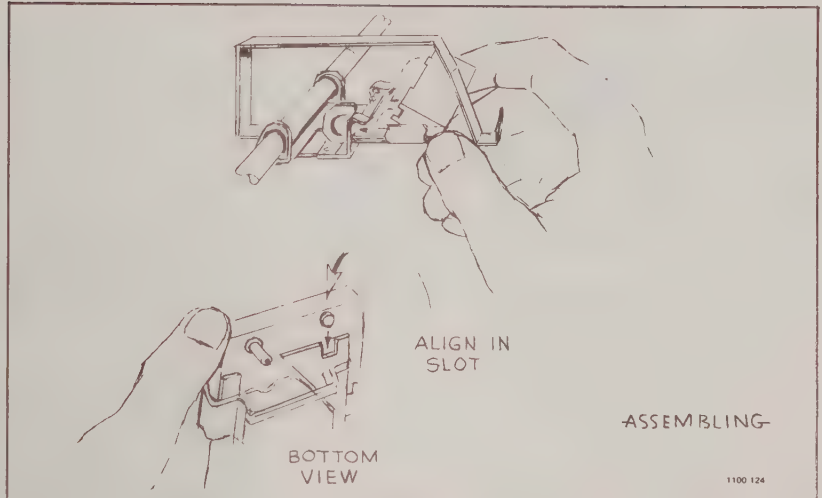
1. Loosen the two mounting screws (one-quarter turn) that hold the right chart latch adjusting plate.
2. Insert a screwdriver into the triangular hole located between the two screws.
3. Turn the screwdriver slightly to move platen inward or outward until the pen trace is clear all the way across the same time line.
4. Tighten two mounting screws.



Instrument is shipped with cartridge holders installed and secured with tape. Ink marker cartridges are included in the accessory kit supplied with instrument. Remove tape from holder(s) and also from pen lifter rod(s) prior to starting cartridge installation. On two servo instruments, displace the carriages to obtain working room to install cartridges. The purple marker cartridge is only used on two servo instruments.

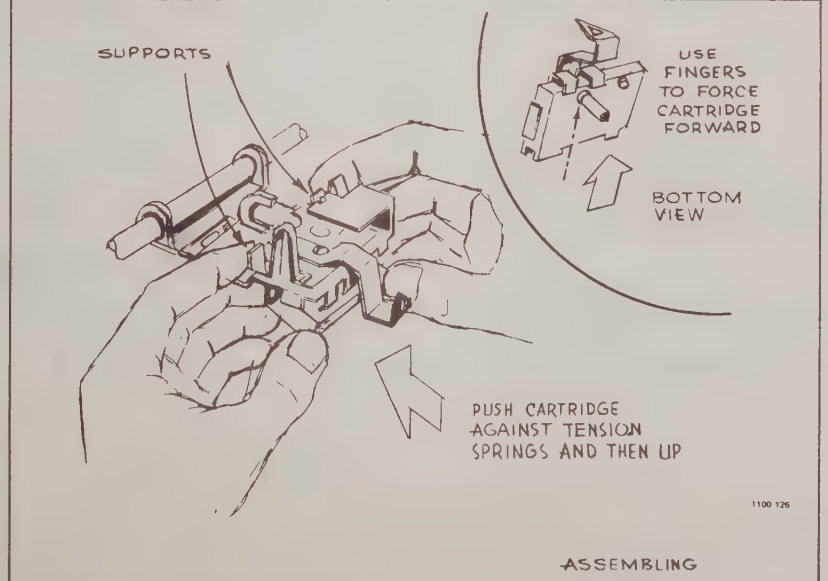
Install Red Marker:

1. Remove protective cap from fiber tipped marker.
2. Rest marker cartridge on top surface of #1 servo carriage assembly.
3. Slide cartridge straight back, guiding against left side and maintaining contact with top surface of holder.
4. Using both hands, grasp rear corners of holder with forefingers and use thumb to apply force to front edge of cartridge. Plastic tenon on lower side of cartridge must "snap" into slot in holder (interference fit).
5. Make sure lower surface of cartridge is in contact with upper surface of holder, cartridge tabs are secured under spring clips, and interference fit on plastic tenon is achieved.
6. Release #1 pen lifter to place marker in contact with chart; check adjustment of pen lifter as described below.
7. To remove old cartridge, rest thumbs on lower portion of holder, grasp rear corners of cartridge with forefingers and force cartridge toward you until free of spring retainers.



Install Purple Marker:

1. Remove protective cap from fiber tipped marker.
2. The purple marker cartridge (for #2 servo) is installed underneath the carriage assembly. Insert back tabs of cartridge into spring clips on holder and guide cartridge against left side of holder.
3. Using both hands, grasp rear corners of holder with forefingers and use thumbs to apply a rearward and upward force to front edge of cartridge.
4. When upper surface of cartridge is flush against lower surface of holder, move thumbs to front of holder. Spring clips will temporarily hold marker cartridge in position.
5. Seat marker cartridge by forcing toward you. Use forefingers to apply pressure on rear corners of cartridge and squeeze toward thumbs. Slot in holder provides



Section 354-32

interference fit with barrel of fiber tip marker.

6. Make sure cartridge is fully forward in holder, upper surface of cartridge is in contact with lower surface of holder, tabs are secured by spring clips, and interference fit on marker barrel is achieved.
7. Release #2 pen lifter to place marker in contact with chart; check adjustment of pen lifter as described below.
8. To remove old cartridge, grasp rear corners of holder with forefingers, force cartridge back with thumbs, lower front edge to clear holder and bring cartridge forward with forefingers.

Check Pen Lifter Adjustment:

Pen lifter(s) are factory adjusted prior to shipment, however, a check is recommended after installing new marker cartridges.

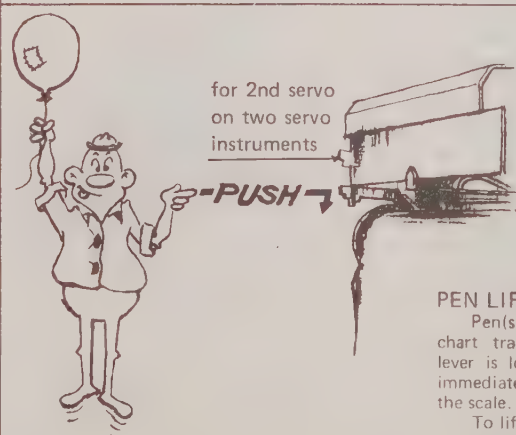
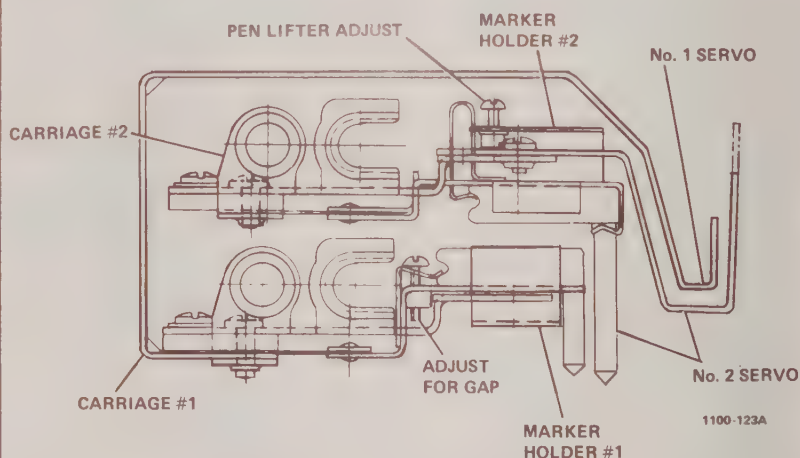
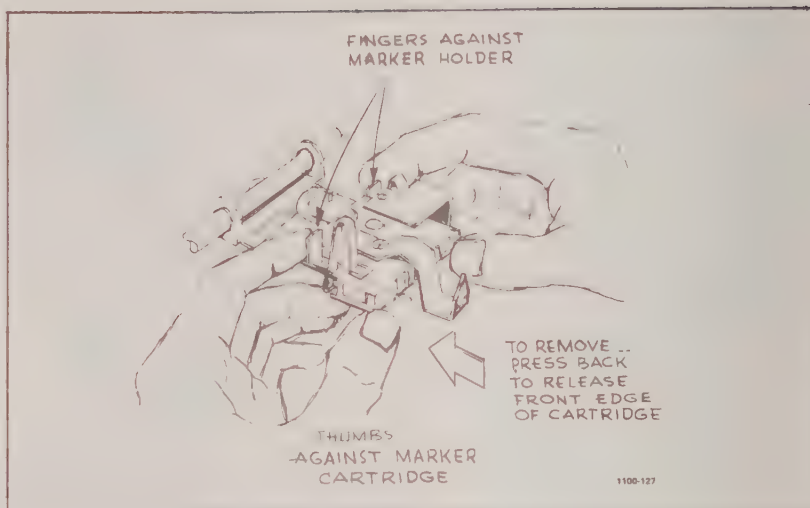
Actuate pen lifter by pushing lever in until it locks; check for small air gap between marker tip and chart. This verifies that pen has been lifted from chart.

Raise lever and release pen lifter. With marker in contact with chart, check for small air gap between adjustment screw and marker holder assembly. This verifies that full weight of ink cartridge is applied to marker tip to maintain proper writing pressure.

4. Pen lifter adjustment is not required if some gap is observed in steps 2 and 3.
5. If necessary, turn adjustment screw clockwise to increase gap between marker and chart. Turn counter-clockwise to increase gap between adjustment screw and holder.
6. On two servo instruments verify that both carriage assemblies can travel full scale without interference between markers, pointers or holders. Check for clearance with both pens recording, both pens lifted, and both combinations of one pen lifted.

To Order Replacement Cartridges:

Replacement cartridges are available in packages of 4 or 12. For Red Markers specify 30733241-1 (Qty. 4) or 30733241-3 (Qty. 12). For Purple Markers specify 30733241-2 (Qty. 4) or 30733241-4 (Qty. 12).



PEN LIFTER

Pen(s) lift automatically whenever chart transport is "OPENED". Manual lever is located on the front of chassis immediately adjacent to the left edge of the scale.

To lift, push it straight in, then slightly downward until notch engages.

To release, merely flick lever up. It will snap out.

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COMMENTS

Adherence to a routine inspection and maintenance program will insure optimum instrument performance and should reduce servicing requirements to a minimum. The checks and maintenance procedures included in this section are recommended to supplement normal industrial cleaning procedures.

The frequency of periodic maintenance is a function of instrument operating time and span step response time

(balance speed). For example, an instrument with a 5 second response time may require more frequent maintenance than one with a 15 second response time for the same number of operating hours. For continued satisfactory performance, establish a regular maintenance schedule in accordance with the instrument operating cycle. Include in the maintenance schedule the inspection of items such as relays, MICROSWITCH units, any gears and other moving parts.

You can perform some maintenance with the instrument in service; but for certain procedures such as performance checks, you will have to shut down the instrument.

Routine checks are tabulated in this section. Some procedures are given; others are cross-referenced to other sections of this manual.

CHECKS AND PROCEDURES

What To Do	When	How
Balancing Components		
1. Clean and lubricate gears behind slide-wire.	1. Every 6 months.	1. See oiling points in following Maintenance Section 453. NOTE: The servo (balancing) motor is factory-lubricated and does not require periodic oiling. NOTE: Do not oil slidewire drive cable. Wipe it off with a clean dry cloth to remove any oil or accumulated dirt.
2. Adjust sensitivity.	2. Monthly	2. Adjust gain; refer to OPERATION section 311.
3. Check deadband	3. Varies with type of use.	3. See Section 424 for CALIBRATION.
4. Check and clean rebalancing element (slidewire)	4. Every 6 months.	4. See REBALANCING ELEMENT (Slidewire) MAINTENANCE Section 446.
Recording & Indicating Components		
1. Change chart.	1. Tattle-track feature gives warning on standard strip chart. If preferred, duration of chart at selected speed can be calculated for single-speed chart systems and replacements made on periodic basis.	1. Refer to OPERATION section - 353.
2. Clean scale.	2. As required.	2. Use a soft cloth with a soap and water solution to remove dirt, grease, and ink. Do not use alcohol base solvents which may attack the lacquer finish of scale.
3. Check pen(s) trace for acceptable quality.	3. If pen exhibits excessive skipping, or trace is too light or too wide, replace marker cartridges.	3. Refer to OPERATION Section 353.

ELECTRONIK 111-112 RECORDERS MAINTENANCE

Section 411-103

What To Do	When	How
4. Check alignment of recording system.	4. When record does not coincide with appropriate chart graduations.	4. See SERVICE MANUAL 11-02-01.
5. Check chart drive system:	5.	5.
(a) Clean gears.	(a) As required.	(a) Use a stiff bristle brush and solvent.
(b) Lubricate	(b) Once a month.	(b) See oiling points in MAINTENANCE Section 453. Oil lightly using either Type L-1* or equivalent high grade instrument oil.
* supplied in accessory kit.		NOTE: The chart motor is factory lubricated and does not need periodic oiling, however, the external drive pinion is not sealed and should be lubricated as part of the chart drive system.

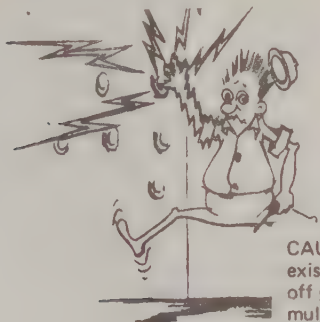
WARNING ON CARE IN CLEANING

There are many polycarbon components used in this instrument because of their durability and ability to hold precise tolerances over a long life. The material also does not "outgas" onto electrical contacts, etc., making it invaluable as supporting members around electrical and electronic components.

However, to protect these components do not use chlorinated solvents in cleaning. If such a solvent should splash onto these components, it will make them brittle and easily damaged. Therefore do not use anywhere inside the instrument such solvents as carbon tetrachloride, trichloroethane, and "Freon"-TMC (an azeotrope "Freon"-TF and methylene chloride).

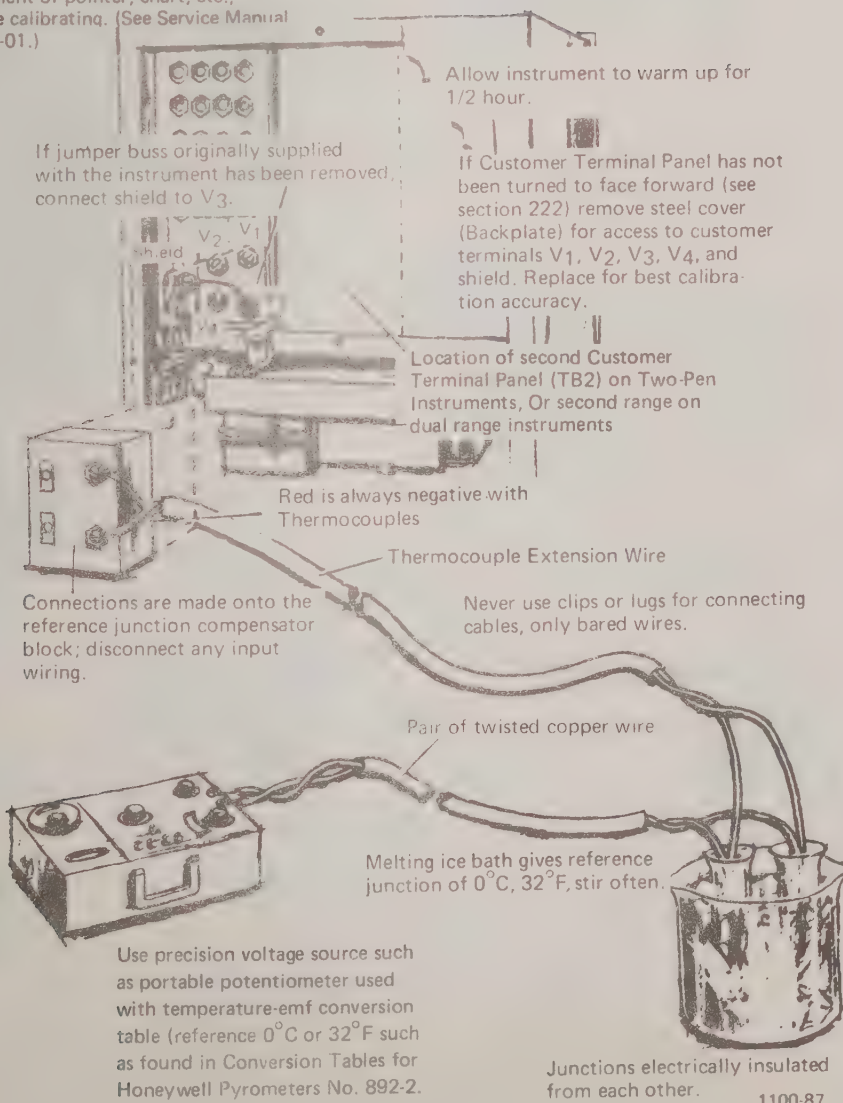
When a solvent is needed at all, we recommend "Freon"-TF (trichlorotrifluoroethane).

THERMOCOUPLE ACTUATED ONE & TWO PEN RECORDERS



CAUTION: Dangerous stray voltages can exist. Before touching connections, turn off power and check each terminal with a multimeter. For best results check alignment of pointer, chart, etc., before calibrating. (See Service Manual 11-02-01.)

MOST ACCURATE METHOD: using 0°C (32°F) reference



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ELECTRONIK 111/112
CALIBRATION PREPARATION
MAINTENANCE

Section 422-12

THERMOCOUPLE ACTUATED
ONE & TWO PEN RECORDERS

FIELD CALIBRATION: using
ambient temperature reference.

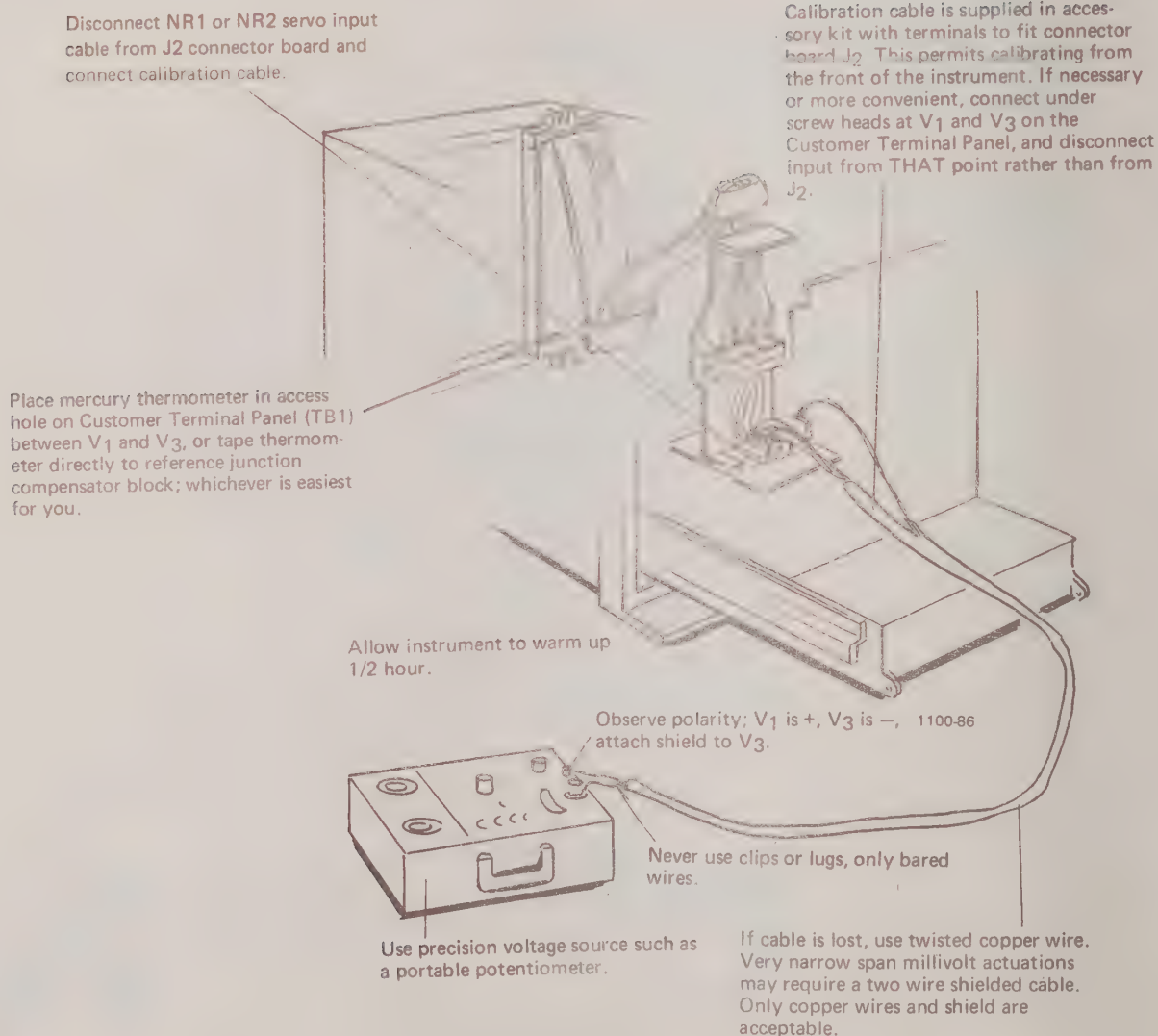


Figure 2

THERMOCOUPLE ACTUATED MULTIPOINT STRIP CHART RECORDERS

The reference junction temperature compensator, on thermocouple actuated multipoint recorders, is a winding of copper wire around the anodized aluminum center section of the process input terminal panel TB3. See Figure 3.

The aluminum block provides equal ambient temperatures from Point 1 through Point 24. This temperature reference winding is then connected to terminal panel TB1 by a 2-wire cable; white/green to V4 and white/gray to V2. From TB1, it is then routed to instrument measuring circuit unit.

WIRING, MULTIPOINT RECORDERS

Method "A" (Suggested)

Connect a thermocouple compensated extension wire (iron/constantan or chromel/alumel, etc.) from selected thermocouple input terminals of TB3 to portable test pot. See Figure 3. The negative lead of the extension wire is color coded red. The reference junction is now at the portable test box; measure the reference junction temperature there with a mercury in glass thermometer.

Method "B" (Alternate)

Connect two plain copper wires from the portable test pot to the selected process input terminals of TB3. The reference junction is now at terminal board TB3 and there are a few ways to determine the reference junction temperature. (1) At the back of the case, tape a mercury in glass thermometer across the top of terminal board TB3 with bulb end at Point No. 1, or (2) if calibration check must be performed on a point other than No. 1, tape the thermometer to the terminal block at or close to the point being checked. (3) From inside the instrument case, locate the metal knockout plug at the center of terminal block TB3. Remove plug and place the bulb end of mercury thermometer in this hole.

Method "C" (Preferred)

The ice bath is the most accurate method of calibrating thermocouple actuated instruments. See Figure 4 and connect two copper wires to thermocouple extension wire and put the two junctions in an ice bath. Connect the other two ends of thermocouple extension wire to TB3.

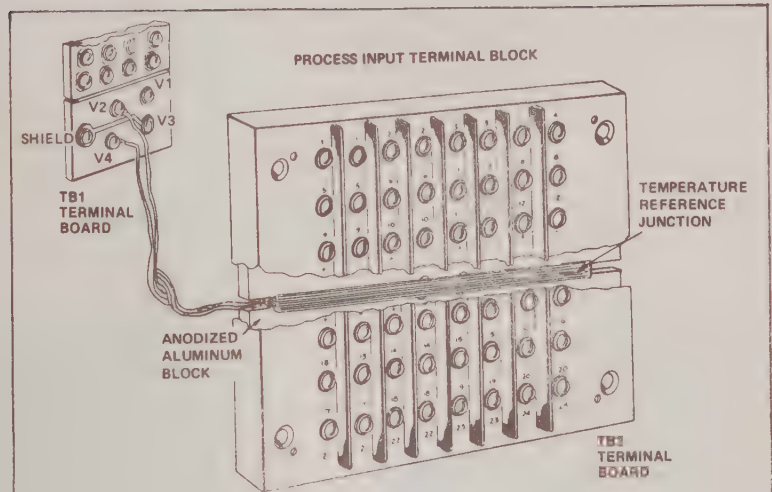


Figure 3

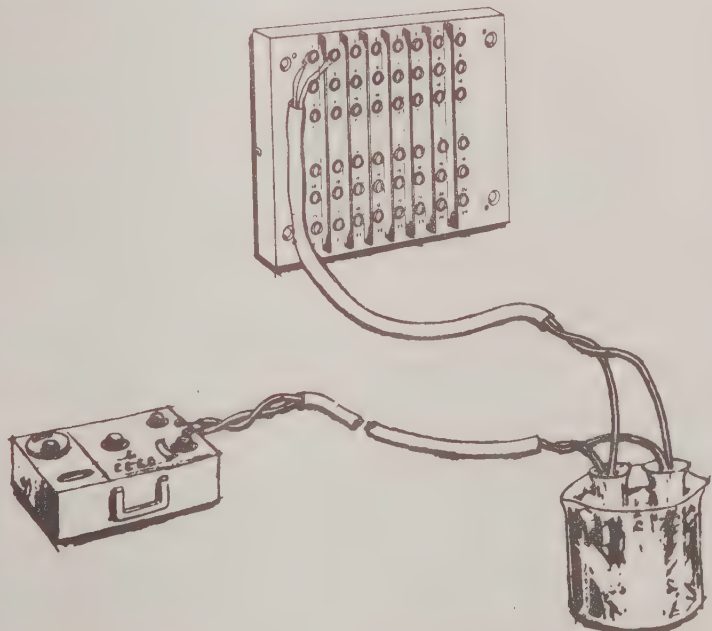
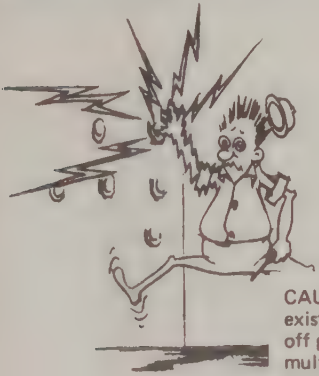


Figure 4

D-C VOLTAGE AND TACH- OMETER ACTUATIONS



CAUTION: Dangerous stray voltages can exist. Before touching connections, turn off power and check each terminal with a multimeter. For best results check alignment of pointer, chart, etc., before calibrating. (See Service Manual 11-02-01.)

990-207 -2

Disconnect NR1 or NR2 servo input cable from J2 connector board and connect calibration cable.

Calibration cable is supplied in accessory kit with terminals to fit connector board J2. This permits calibrating from the front of the instrument. If necessary or more convenient, connect under screw heads at V1 and V3 on the Customer Terminal Panel, and disconnect input from THAT point rather than from J2.

Allow instrument to warm up 1/2 hour.

Use precision potentiometer to read voltage drop across resistor. Attach as close to resistor as practical. Do not use clips or lugs, only bared wires.

Construct a voltage divider using laboratory type precision resistors (0.05% or better) with values appropriate for your instrument span. This will permit you to read on the precision potentiometer a convenient proportion of the total input voltage.

If cable is lost, use twisted copper wire. Very narrow span millivolt actuations may require a two wire shielded cable. Only copper wires and shield are acceptable. Connect SHIELD to V3.

d-c laboratory bench supply

Observe polarity: V1 is +, V3 is -.

(Same as instrument ground)

ElectroniK 111/112 One and Two Pen Recorders Calibration Procedures

Maintenance

This ElectroniK instrument has been inspected, adjusted, and calibrated before it leaves the factory. While instrument is ready for use when received, the following adjustments may be necessary from time to time.

Open instrument door, release latch and pull out the chassis, see Figure 1.

Release latch on both sides of the chart transport and remove chart transport, see Figure 2.

Switch on instrument power and allow for a short warm up period.

Primary Checks

Check alignment of indicating pointer. Drive pointer downscale and note the point on the scale at which it drives against the stop. Drive pointer upscale and do likewise. These noted check points should be equidistant from the stops at zero and one hundred percent of scale. If they aren't, loosen the screw where the drive scale is connected to the carriage assembly and realign the pointer.

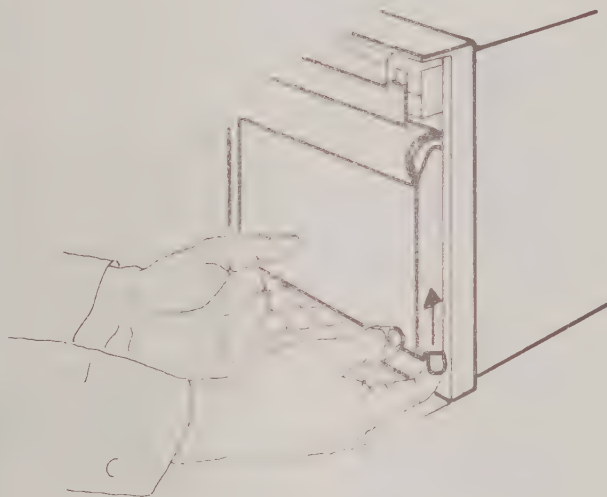


Figure 1 – Release Chassis Latch, Pull Out Chassis

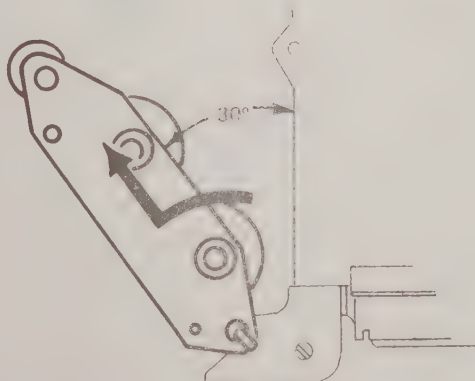


Figure 2 – Remove Chart Transport

Reference Junction

The reference junction temperature compensator, on thermocouple actuated multipoint recorders, is a winding of copper wire around the anodized aluminum center section of the process input terminal panel TB3. See Figure 3.

This temperature reference winding is connected to terminal panel TB1 by a 2-wire cable; white/green to V4 and white/grey to V2. From TB1, it is then routed to instrument measuring circuit unit.

Check Deadband

1. Set the amplifier gain adjust in full clockwise position — see Figure 4. Supply an input signal to the recorder and adjust amplifier gain until pointer stops oscillating.
2. Set the stepping switch of the portable pot to a millivolt output equal to 50% of range span. Note the position of pointer on scale. Turn the stepping switch to drive pointer upscale and slowly return it to its original set millivolt position. Note the position of the pointer on scale. If the difference between the two points (deadband) exceeds 0.1%, increase amplifier gain (clockwise adjustment). Deadband should not be adjusted below 0.1%, since it may increase the instrument's susceptibility to electrical noise signals. (Figure 5)
3. With the stepping switch still set at 50% of range span, drive the pointer downscale and return it to its original set millivolt position. Note the position of pointer on scale. Deadband should not be less than 0.1% of full scale.

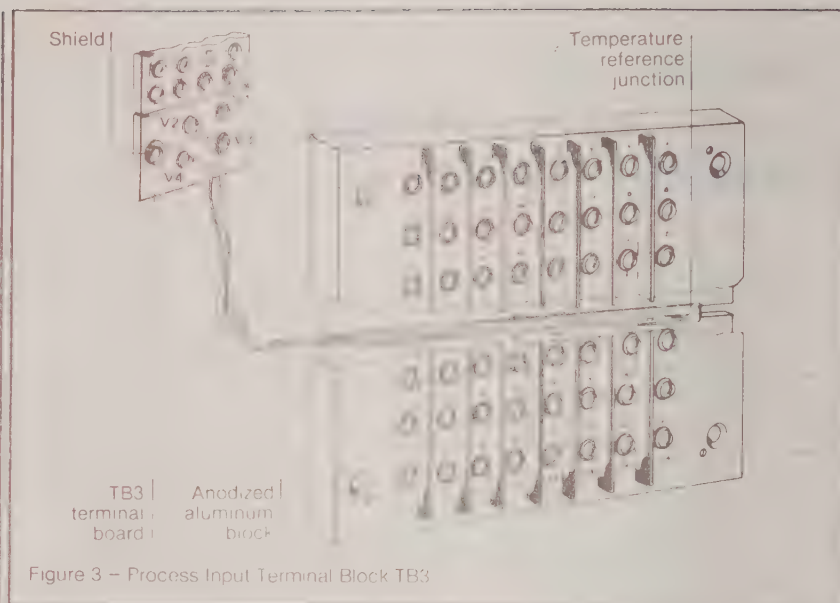


Figure 3 — Process Input Terminal Block TB3

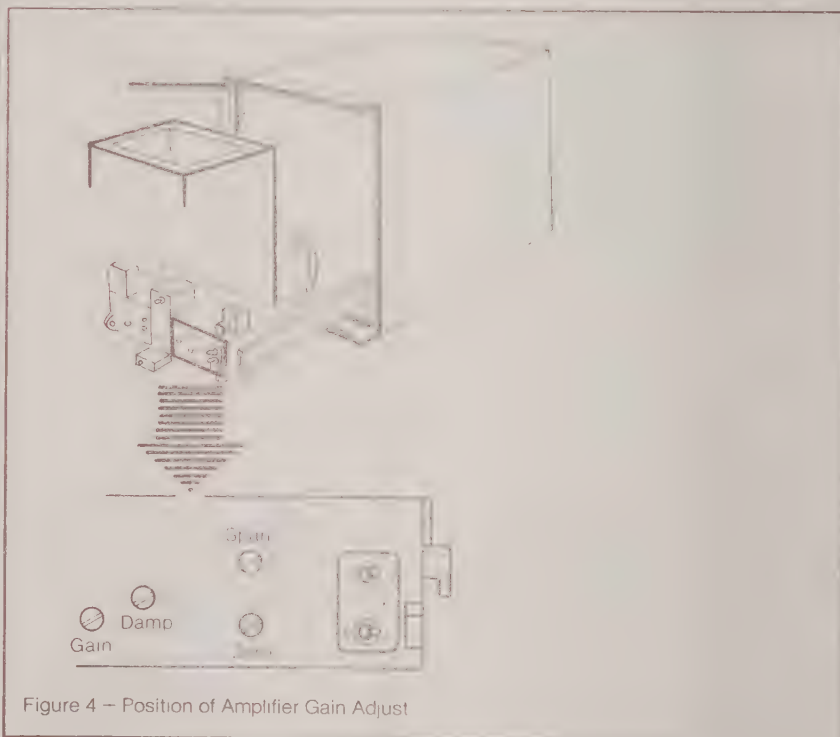


Figure 4 — Position of Amplifier Gain Adjust

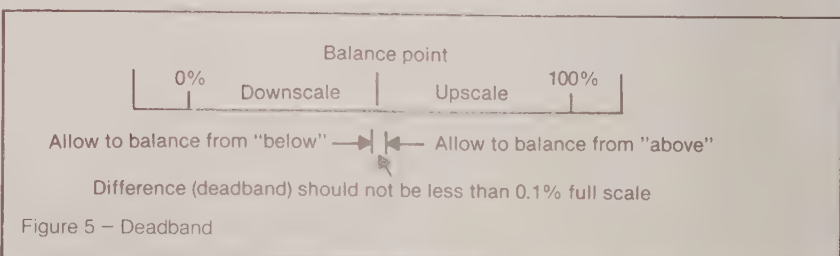


Figure 5 — Deadband

Dual Range

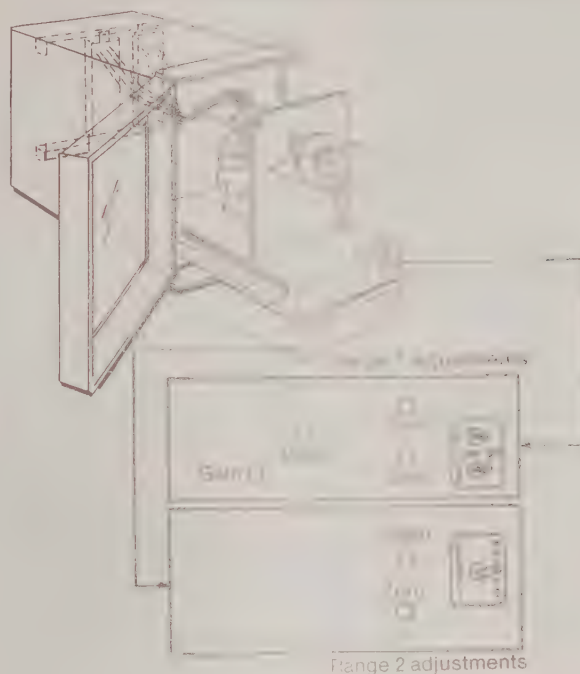
On dual range recorders, zero and span adjustments are necessary for each range. The adjustments for range 1 are on the servo amplifier located under the chassis on the model 111 (Figure 6) and on the right side of the recorder under the chassis on the model 112 (Figure 7).

The adjustments for range 2 are on the dual range amplifier located under the servo amplifier on the model 111 (Figure 6) and on the left side of the chassis on the model 112 (Figure 7).

Range selection is determined by a switch on the front of the chassis (Figures 6 and 7).

NOTE: ON DUAL RANGE RECORDERS, RANGE 1 MUST BE CALIBRATED BEFORE RANGE 2.

Use the procedures that follow on next page.



1100 236B

Figure 6 - Model 111



1100 237B

Figure 7 - Model 112

Calibration, One & Two Pen Recorders, Without Burnout

1. Check instrument calibration by applying voltages corresponding to several cardinal points on the scale. If instrument calibration is within $\pm 0.3\%$ of full scale or 20 microvolts (whichever is greater) calibration is satisfactory; if not, proceed as follows:
2. Set voltage source to a value which corresponds to about 10% full scale voltage equivalent to instrument span.
3. Adjust zero potentiometer until instrument balances at that same position.
4. Set voltage source to a value which corresponds to about 90% full scale voltage equivalent of instrument span.
5. Adjust span potentiometer until instrument balances at that scale point.
6. Continue adjusting span and zero until calibration is within $\pm 0.3\%$ full scale.

Burnout Can Cause Zero Shift

Some Millivolt, thermocouple, and Radiomatic actuators can have a "burnout" option. In Electronik potentiometers with burnout, the resistor burnout signal causes the pen to drive to one end of the scale should the input circuit open. The burnout signal is superimposed on the input signal and causes an offset from zero. Readjusting zero will compensate for this offset.

The magnitude of the zero offset caused by the burnout signal current flowing through the external circuit (source) resistance depends on two factors. (1) instrument span, and (2) external and/or the higher the external resistance, the greater the zero offset.

In calibrating those potentiometers having burnout, a difference in the resistance between the calibration equipment and the actual input source (e.g., thermocouple and extension wires) can introduce a zero offset error proportional to the magnitude of the difference in resistance. Portable laboratory potentiometers normally used for such calibration do not have a fixed output resistance. The resistance at the output terminals varies depending upon the millivolt setting. Such differences within the instrument range create difference in zero offset at the calibration points due to burnout. The difference in zero offset may be significant with narrow spans or with portable potentiometers having high internal resistance.

Calibration with Burnout

Method A

Accurate calibration can be obtained with this method regardless of the variations in resistance of the precision voltage source (usually a portable potentiometer) used for calibration.

1. Adjust the amplifier for optimum sensitivity.
2. Connect a precision voltage source as shown in the CALIBRATION PREPARATION section. If a commercial run up box* is used, be sure that it is a type having a FIXED resistance of 100 ohms or less at the output terminals. If a fixed resistance type is unavailable, then one may be constructed as shown in Figure 8

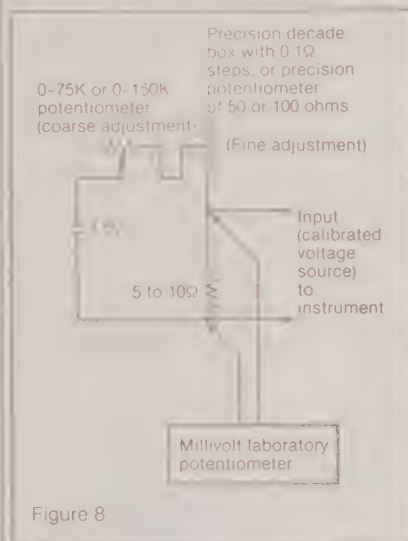


Figure 8

3. Temporarily connect a millivolt laboratory potentiometer and adjust the precision voltage source to a desired value.
4. Disconnect the millivolt laboratory potentiometer and proceed with calibration as described above for instruments without burnout.
5. When completed, use this precision voltage source to supply a signal to cause the instrument to read at some convenient point on scale. Note that point.
6. Now add in series with this precision voltage source, a resistance equal to the resistance of the external circuit normally connected to the instrument (add the resistance of the sensing unit and connecting wires). This will most likely cause a zero shift in the same reading (taken in step 5).
7. Adjust instrument zero to read again the value noted in step 5.

*Also called start-up box by some.

8. Remove all calibration equipment.
9. The instrument is now calibrated AND adjusted for the burnout resistance.

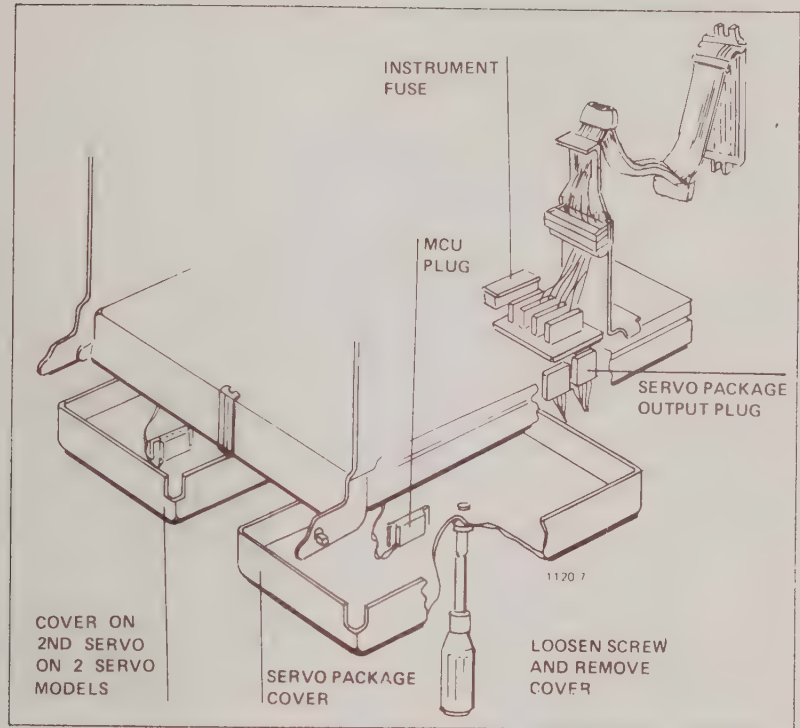
Method B

This method partially compensates for variations in zero shift within the instrument range caused by differences of internal resistance between dial settings of the precision voltage source (usually a portable potentiometer). With wider instrument spans or lower resistance of the calibration potentiometer (precision voltage source), inaccuracy due to zero shift may be negligible.

1. Adjust amplifier gain for optimum sensitivity.
2. Connect the precision voltage source as shown in the CALIBRATION PROCEDURES section. Set it for a value equivalent to the approximate midpoint of the instrument range.
3. Disconnect the battery from the precision voltage source, measure and note the resistance of the output terminals of the calibration setup.
4. Reconnect the battery and calibrate as described above for instruments without burnout.
5. When completed, use the precision voltage source to supply a signal to cause the instrument to read approximately the midpoint of scale. Note the value.
6. Measure the resistance of the external circuit normally connected to the instrument (sensing unit and connecting wires). Find the difference between this resistance and the resistance of the calibration setup as found in step 3.
7. Add a resistance approximately equal to this difference (step 6) in series with the calibration setup. Note the amount of offset compared to reading in step 5.
8. Remove series resistance and allow instrument to return to midpoint reading observed in step 5.
9. To correct for offset, adjust instrument zero from reading observed in step 5 by an amount equal to the offset:
If resistance of external circuit is HIGHER than that of calibration setup, shift zero DOWNSCALE.
If resistance of external circuit is LOWER than that of calibrating setup, shift zero UPSCALE.
10. Remove all calibration equipment.
11. The instrument is now calibrated and adjusted for burnout resistance.

TO EXPOSE SERVO PACKAGE

Servo package is under chassis. To expose components, loosen captive screw in center of cover, then remove cover.



4

TO REMOVE SERVO PACKAGE

It is not necessary to remove servo package to change measuring circuit unit, constant voltage unit, or most other components. Nevertheless some will find removal convenient.

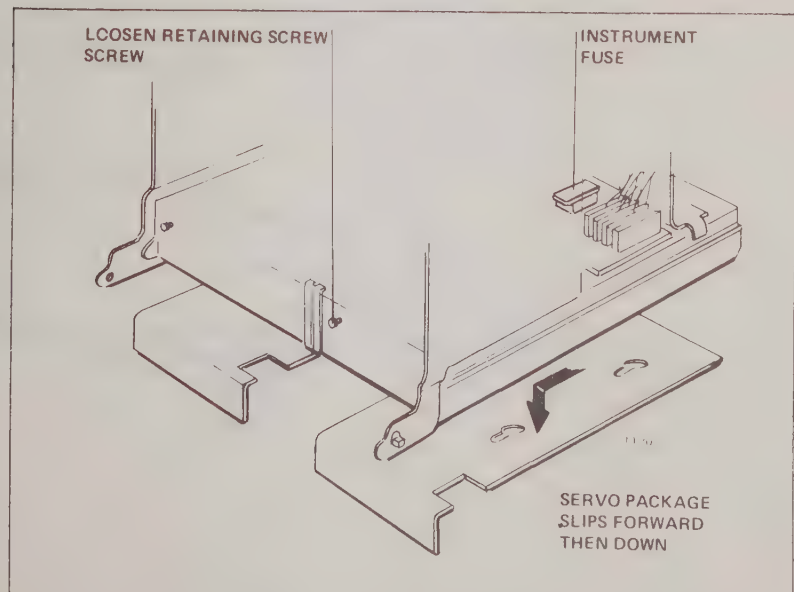
1. Disconnect servo package output plug from below J2 connector block on rear of deck of chassis.
2. Disconnect plug to measuring circuit unit (MCU) in front right corner of servo package.
3. Loosen retaining screw to permit servo package to slide forward to clear keyhole slots, then package will drop free.

SERVO PACKAGE COMPONENTS

Illustration on next page shows standard orientation of components in the servo package:

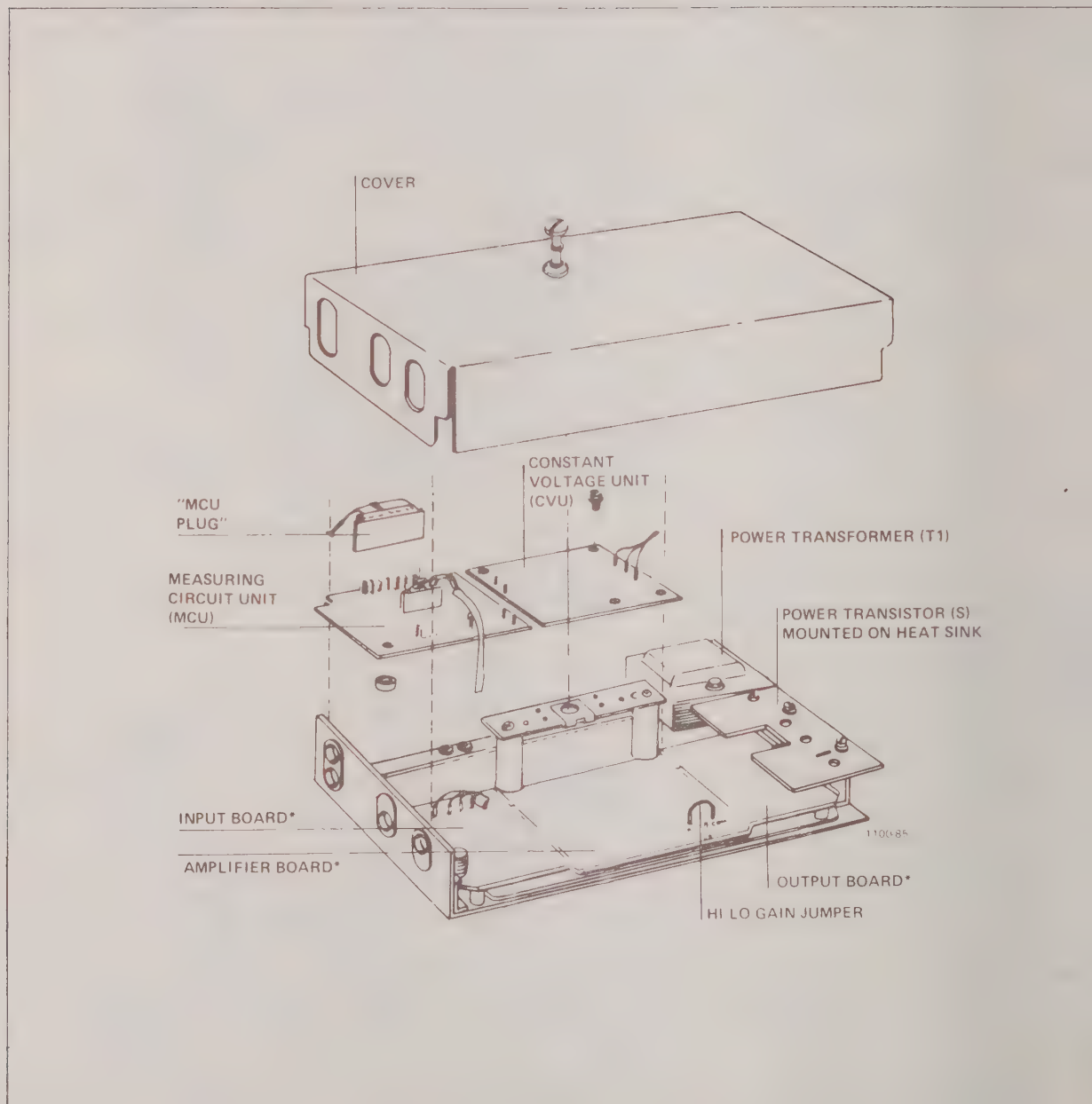
- Measuring Circuit Unit (MCU)
- Constant Voltage Unit (CVU)
- Power Transformer
- Amplifier Board (on push-pull versions this is three boards: input, amplifier and output).

For further detail, see parts lists.



ELECTRONIK 112
SERVO PACKAGE ACCESS
MAINTENANCE

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*These components are three boards on push-pull amplifier versions (used for one second servo speeds and/or spans of less than 5 millivolts), they are one board on single end amplifiers.

INTRODUCTION

WIPER ARM ASSEMBLY

The arm consists of a contact wiper and collector coil. The four-fingered contact is gold alloy and is fused to the end of contact arm. The spiral collector coil provides an electrical connection between the wiper contact and collector terminal. The collector coil and the four fingered contact on the wiper arm assembly are fragile and can easily be disfigured. Handle with care.

WIREWOUND SLIDEWIRE

The winding of the slidewire is made of platinum alloy to resist corrosion and shunted with manganin wire. There are approximately 2550 convolutions that provide high resolution.

CONDUCTIVE PLASTIC SLIDEWIRE

Conductive plastic is a hard, wear resistant, chemically inert plastic track bonded to an insulator base. It is more precise (better resolution) than a wirewound slidewire and generates less noise. The large cross sectional area of conductive plastic will not develop opens or shorts. It requires little or no maintenance.

WARNING: Guard against excessive wiper current during installation or removal of plastic slidewire. Current in excess of 10 milliamperes will destroy the conductivity of plastic strip. A (V.O.M.) Volt, Ohmmeter is used during the installation procedure. If you are not sure of current draw of your meter, place a current reading meter in series with V.O.M. Move selector switch through various resistance ranges to determine the short circuit current of each range and use the range that draws less than 10 milliamperes of current. **OTHER TESTING PRECAUTIONS** can be found at the end of this section.

CLEANING

Under normal operating conditions, the slidewire or plastic strip does not require any maintenance. However, if instrument doesn't operate properly and a dirty slidewire or plastic strip is suspected, proceed as follows:

1. Turn off all power to instrument.
2. Either remove plastic cover (common mode barrier), or remove lower right screw and lift barrier aside.
3. Remove red, white and black leads to terminal connectors.
4. Refer to warning at beginning of this section regarding plastic slidewires. Refer to Figure 2 and connect one ohmmeter lead to collector terminal of slidewire and one lead to terminal designated as zero percent of range span.

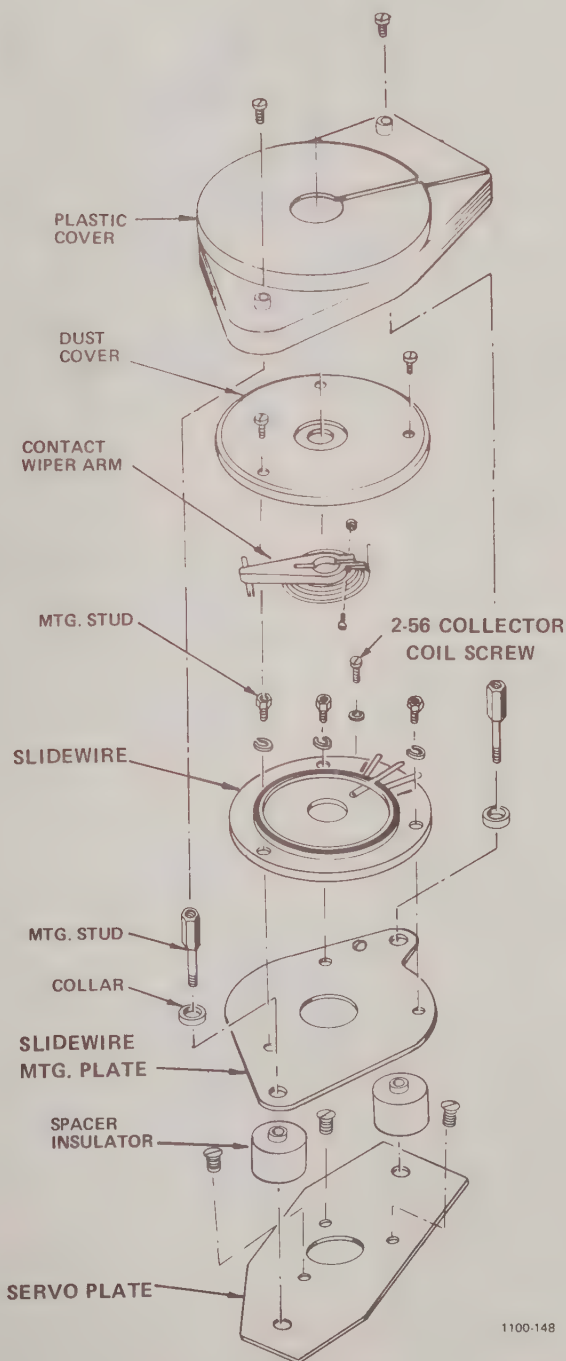


Figure 1

1100-148

Section 446-1

5. Turn bull gear through its full travel from stop to stop. Ohmmeter will fluctuate at dirty spots and even show an open circuit.
6. If element is dirty proceed to FRONT SERVO DISASSEMBLY section that follows.

FRONT SERVO DISASSEMBLY

1. Disconnect all power to instrument.
2. Release chassis latch, pull out chassis, remove chart transport and remove or lift up top cover of chassis.
3. Rotate bull gear until cable drum set screw is topside. Loosen set screw. Move bull gear fully clockwise so that carriage fastening point on drive cable is at extreme left of scale. Apply strips of masking tape over top of cable drum groove and down cable drum sides to hold cable in place. Slide cable drum off servo shaft and move drum to left out of way.

NOTE: Step 3 may be difficult to perform on 2-pen recorders. If cable drum and drive cable cannot be moved to a point that will permit removal of either slidewire from servo shaft, then the drive cable must be disconnected from cable drum and pulleys.

4. Remove plastic cover (common mode barrier) and dust cover from slidewire. Remove red, white and black input leads from connector terminals by pulling on lead wire lugs. **DO NOT PULL ON LEAD WIRES.** Disconnect blue wire from mounting plate.
5. Turn bull gear so contactor on wiper arm is at 10 o'clock on face of slidewire element.
6. Loosen the 2-56 binding head screw at top of collector terminal. Turn bull gear counter-clockwise and the looped end of wiper arm coil will move off the 2-56 mounting screw. Some early versions had a ring at end of coil. In this case, remove the 2-56 binding head screw entirely.
7. Loosen the capscrew, that locks wiper arm to servo shaft, with bristo wrench 30360711-001. Place small screwdriver between top of wiper arm and inner part of plastic base of element. Pry wiper arm away from plastic base of slidewire as far as you can with a small screwdriver. Grasp wiper arm with either hand and pull it off servo shaft . . . gently.
8. Disconnect 3 hex head mounting

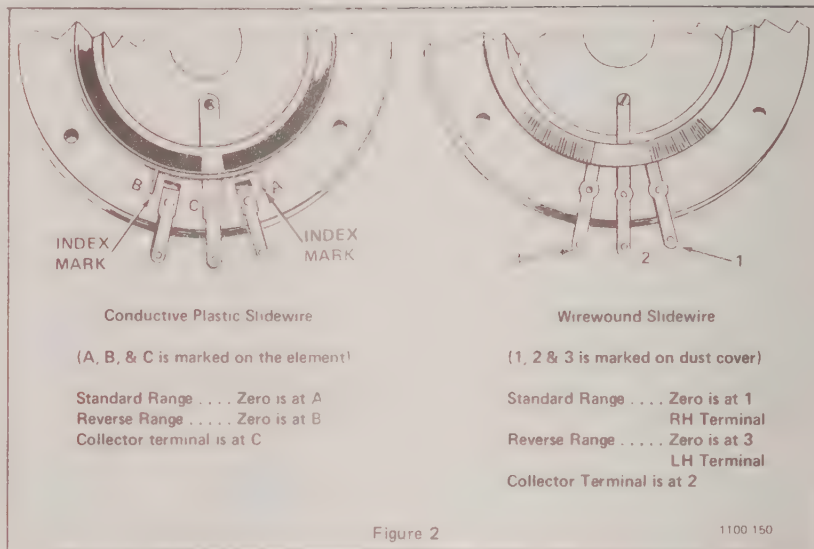


Figure 2

1100 150

studs and remove slidewire element from mounting plate.

9. Remove remaining 2 hex head studs, collars, spacers and the slidewire mounting plate.
10. Thoroughly clean area. Use Chlorothene-Nu on unpainted surfaces and warm water with a mild detergent on painted and plastic surfaces.

MAINTENANCE

WIPER ARM ASSEMBLY

1. The collector coil and four fingered contact on the wiper arm assembly are delicate and easily disfigured components of servo rebalancing circuit. Handle with care.
2. Do not lift the wiper contact by hand, bent wiper fingers will result in poor contact between wiper and plastic strip.
3. Clean the wiper by placing a piece of bond paper between wiper contact and plastic strip and turning the bull gear back and forth.

CONDUCTIVE PLASTIC SLIDEWIRE

Clean the conductive plastic element with alcohol or "Freon"-TF. Do NOT use any chlorinated solvents such as Chlorothene-Nu or "Freon"-TMC. Apply alcohol with a commercial applicator such as a mini-wipe, or use a lint free cloth. Air dry element.

WIREWOUND SLIDEWIRE

1. Clean the wirewound slidewire with a clean bristled (nylon) brush. Do NOT use a metal or fibre glass brush. See Figure 3 .

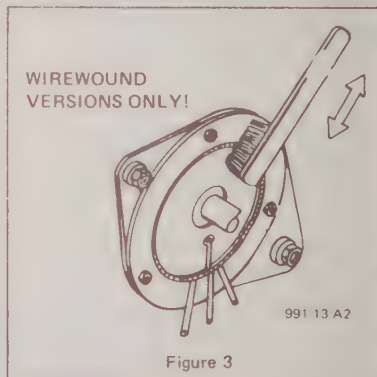


Figure 3

2. Brush the conductive element in the direction of the wire windings.
3. If slidewire is exceptionally dirty, use a spray type solvent like "Freon"-TF. Do NOT use any chlorinated solvents such as Chlorothene-Nu or "Freon"-TMC. If a spray is not available; use alcohol. Air dry the element, do NOT use paper or cloth towels or applicators.

INSTALLING PLASTIC OR WIREWOUND SLIDEWIRE

NOTE: The following procedure is common to both conductive plastic slidewire and wirewound slidewire. Where it differs, the reference to wirewound slidewire will appear in **BOLD** type.

1. Attach the plastic spacers and collars to slidewire mounting plate, see Figure 1 , and fasten to instrument chassis with three small hex head studs and lockwashers, tighten studs.

2. Affix slidewire element to mounting plate with three small hex head studs and lockwashers, semi-tight.
3. Position slidewire centering tool, see Figure 4, on the servo drive shaft, bevelled end toward slidewire. Slide tool along shaft and up against center of slidewire assembly. The bevelled nub will center slidewire.
4. Tighten three mounting studs and remove centering tool.

INSTALLING CONTACT WIPER ARM

1. Rotate servo drive shaft counter-clockwise until bull gear hits the stop.
2. Loosen the 2-56 binding head screw on slidewire collector terminal. Push wiper arm assembly on servo shaft (collector coil side first) so wiper arm is positioned at 7 o'clock, close to, but not on the conductive element.
3. Position wiper close enough to allow collector coil to be connected to collector terminal and yet not allow wiper to make contact with conductive element. Turn bull gear in clockwise direction until the looped end of collector coil comes to a stop against the 2-56 screw on terminal collector. Tighten the 2-56 binding head screw while holding collector spring against center section of slidewire with your left thumb. This will prevent distorting collector coil. The coil should not touch servo shaft.

4. Turn bull gear in clockwise direction against the zero stop.
5. With conductive plastic slidewire, align contact wiper with index mark at "A" or "B" on slidewire moulding. See Figure 2. (At "A" for standard range; at "B" for reverse range.)

With wire wound slidewire, set contact wiper equidistant from zero end and 100% end of slidewire winding.

6. At this point, take wiper contact (pressure) adjusting tool, see Figure 5, 30679100-001 and turn knurled knob tight against locking end of tool. Then back it off one full turn.
7. Push adjusting tool on servo shaft; close to, but not on wiper arm. See Figure 5. Tighten the two clamp screws.
8. See Figure 2 and connect one ohmmeter lead to collector terminal and one lead to either of other terminals (marked "A" &

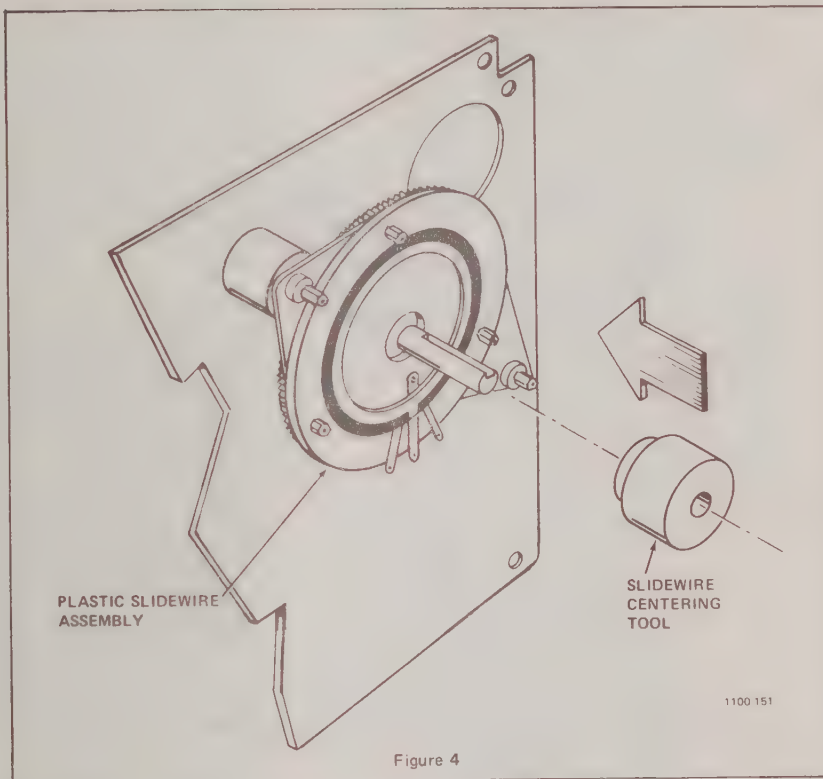


Figure 4

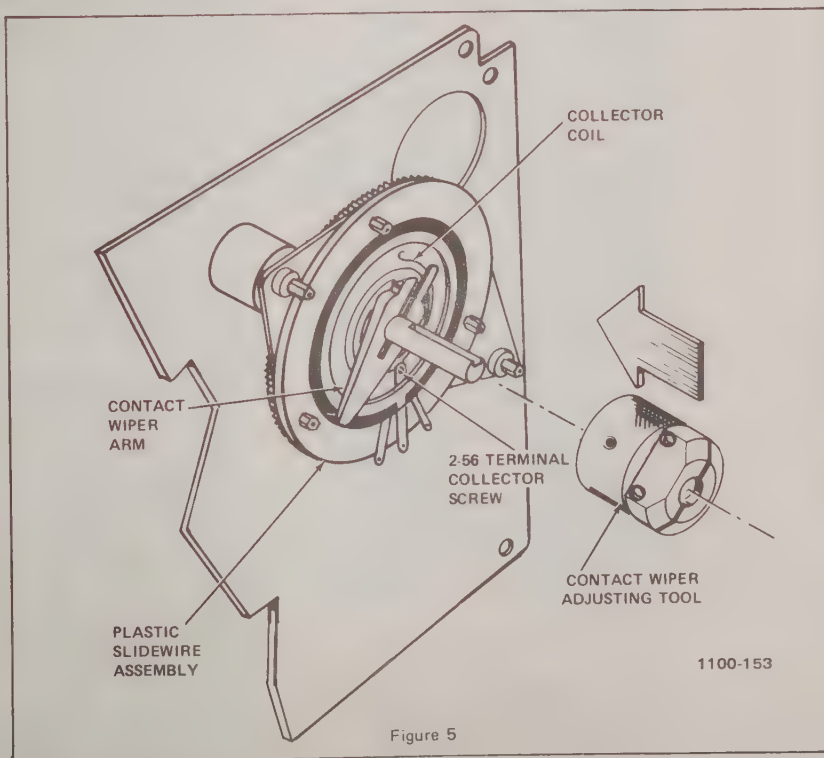


Figure 5

ELECTRONIK 111, 112
CONDUCTIVE PLASTIC & WIREWOUND SLIDEWIRE
REBALANCING ELEMENT AND
WIPER ARM ASSEMBLY
MAINTENANCE

Section 446-1

"B" on plastic slidewire and 1 & 3 on wire wound slidewire cover).

9. Turn knurled knob of brass adjusting tool clockwise until contact with slidewire is indicated on ohmmeter.
10. Push knurled knob forward to its stop. This sets wiper deflection to 0.025" and 10 grams pressure.

NOTE: If soldered joint of contact is colored blue and/or servo plate has label indicating wiper has 0.050 wiper deflection, set wiper an additional 0.025" by turning knurled knob of adjusting tool clockwise again, without disturbing adjusting tool, until inner sleeve is snug against wiper arm. Push knurled knob forward to its stop again. Contact deflection is now 0.050" and contact pressure is approximately 20 grams.

11. Grab the slotted end of the adjusting tool and rotate the contact wiper through its full travel. Be sure the wiper arm does not make contact with the 2-56 binding head screw that connects the collector coil and the collector terminal. Tighten the cap screw at the base of the wiper arm with bristo wrench 30360711-000.
12. Remove wiper adjust tool.
13. See Figure 2 and connect black lead to zero terminal and white lead to (center) collector terminal. The red lead goes on the remaining third terminal and corresponds to 100% of range span. The blue lead is screwed to slidewire mounting plate with a 4-40 binding head screw.
14. Replace dust cover and plastic (common mode barrier) with 4-40 binding head screws. The plastic cover provides protection from shock caused by a difference of potential between the slidewire cover and the case.
15. Grab the taped cable drum and drive cable and move it toward servo shaft. Line it up with and push it on shaft. Turn bull gear until slot in servo shaft is top-side. Align drive cable with pulleys on instrument side plates. Tighten set screw on cable drum, making sure the set screw seats itself in slot of servo shaft. Remove tape from cable drum and drive cables.

NOTE: On multipoint recorders, the cable drum must be mounted on outermost part of servo shaft to clear the plastic cover on slidewire assembly. This will cause the drive cable to be offset at an

angle with the idler pulleys on chassis side plates. Turn bull gear through its full travel and check clearance between cable drum and cable connecting bracket on carriage assembly. It will be narrow. If cable drum obstructs upscale movement of carriage assembly, loosen set screw in cable drum and push drum closer to the plastic cover. Tighten set screw and check again for adequate clearance.

16. Replace/close chassis top cover. Turn on power and check calibration.

OTHER TESTING PRECAUTIONS FOR CONDUCTIVE PLASTIC SLIDEWIRES

1. Never apply a voltage to the wiper terminal.
 - a. "Ohmmeters" built into hand set volt-ohmmeters, when used on the lowest scale, apply a voltage without current limitation and must not be used to locate taps or end points.
 - b. In connecting the potentiometer, first be sure to identify the wiper terminal or lead, and connect it only to high impedance measuring circuits.
 - c. Guard against shorting the wiper to an end terminal. If the end terminal is energized, the wiper will also be energized. Extreme care should be exercised to avoid accidental shorts when using alligator clips.
2. Guard against excessive wiper current in the test circuit.
 - a. A capacitor between the wiper and any part of the power source acts as a dead short to an instantaneous change in voltage. Such a surge can occur when continuity between the wiper and resistance element is broken, or when a power switch is thrown.
 - b. Some load impedances change sharply. A lamp should not be used for checking continuity. For instance a 1 watt 110V incandescent bulb draws a large multiple of its nominal 9 Ma when it is first energized.
3. Check permissible maximum excitation voltage on the end terminals, considering not only the track resistance and power rating, but also the added effect of load current.
4. Guard against internal arcing caused by:
 - a. Discharging of capacitors.
 - b. Surges due to inductive loads.
 - c. Constant current supplies with high open circuit voltage.
5. When testing linearity or conformity be sure to mount the potentiometer so that no significant mechanical eccentricity errors are introduced into the shaft position measurement.
6. When measuring output, use a nulling method or a ratiometer whenever possible. A voltmeter may act as a significant load and may affect the output reading.

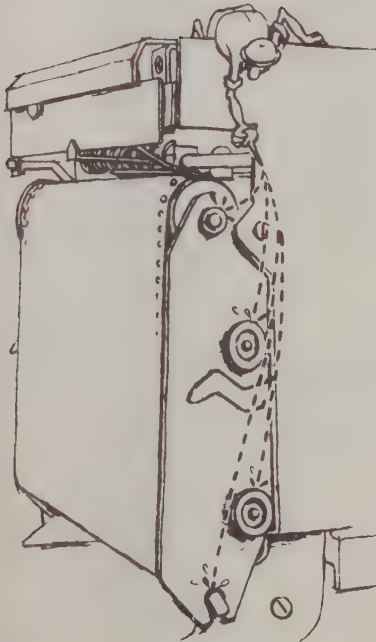
LUBRICATION

Use the high grade instrument oil supplied with the accessory kit.

Wipe away any accumulated dirt from bearing surfaces before application of oil.

Oil lightly at all points indicated in the following illustration.

BOTH SIDES OF CHART TRANSPORT
AT SHAFT ENDS (EVERY 6 MONTHS)
AND HINGE PIVOTS (OIL AS NEEDED)



1100-28-2

REAR OF SERVO SHAFT(S)
(OIL EVERY 6 MONTHS)

POSITION OF
SECOND SERVO
ON TWO SERVO
VERSIONS

FRONT OF SERVO SHAFT(S);
SERVO DRIVE GEARS
(OIL EVERY 6 MONTHS)

CHASSIS SLIDES
(OIL AS NEEDED)

1100-30-2

PEN LIFTER MECHANISM
(OIL AS NEEDED)

CHART DRIVE GEARS
(OIL MONTHLY)

CHART TRANSPORT LATCHES
(OIL AS NEEDED)

1100-31-3

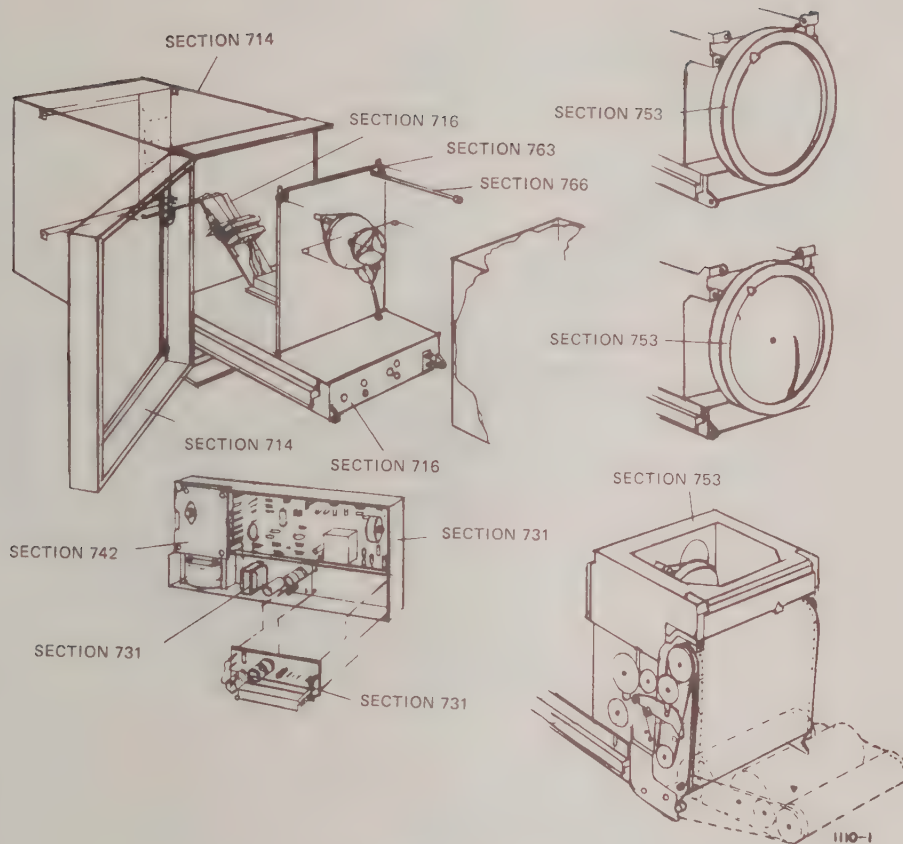


Figure 1. Basic Instrument.

**Figure 1
and
Key No.**

Description

Major instrument components parts lists will be found by referring to sections bearing the first 3 digits of a section number.

714-	enclosures, door and case
716-	chassis
731-	servo package
731-	measuring circuit unit
731-	circuit voltage unit
742-	amplifier
749-	servo motor
753-	display package
765-	set point and cables
766-	front set contact control

ELECTRONIK 112
16" AND 19" WIDE CASE AND DOOR
PARTS LIST

Section 714-69, Issue 4

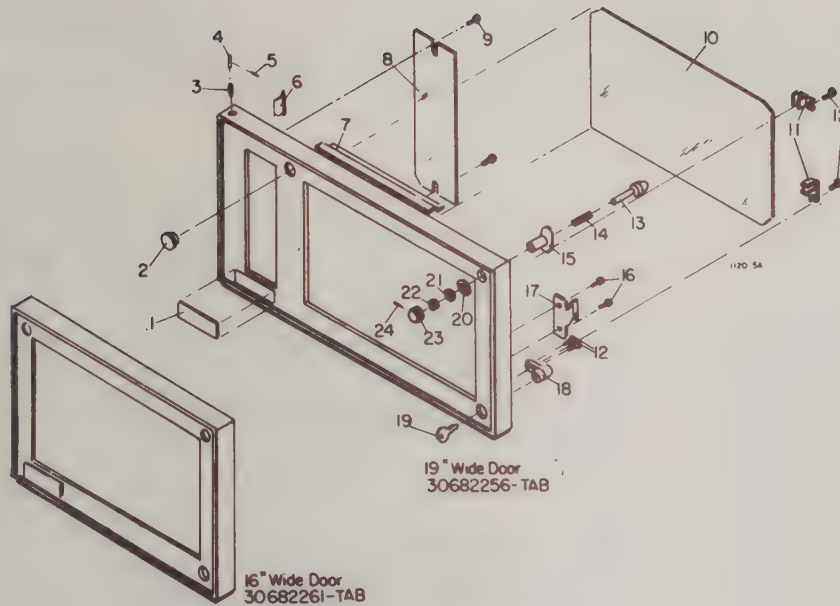


Figure 1. Door Assembly 112

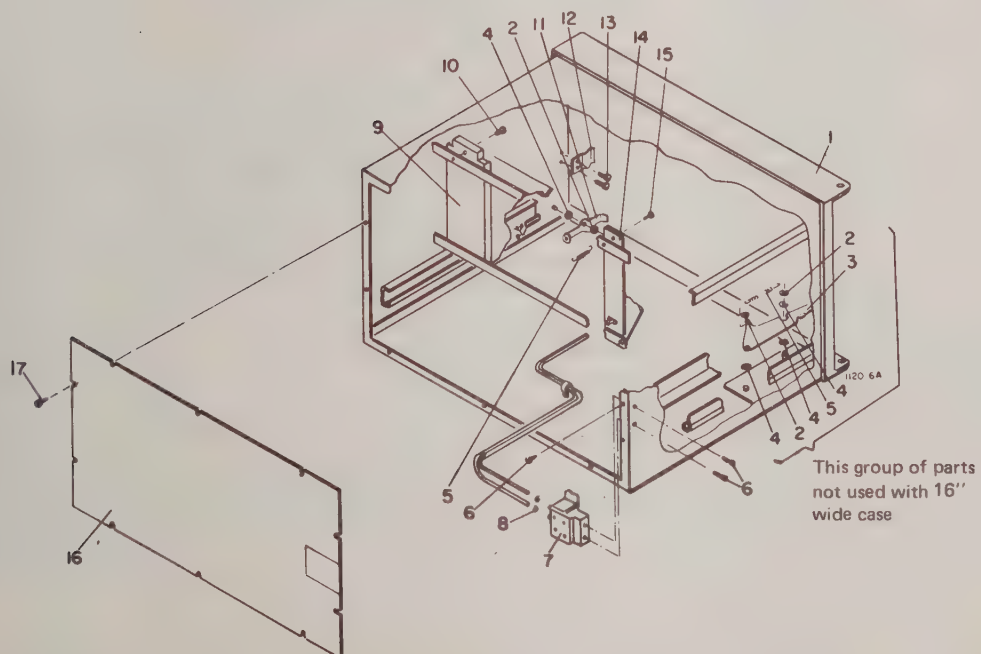


Figure 2. Case Assembly 112

Process Control Division, 1100 Virginia Drive, Fort Washington, PA 19034

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ELECTRONIK 112
16" AND 19" WIDE CASE AND DOOR
PARTS LIST

Section 714-69

IMPORTANT

1. An asterisked part number indicates that the described part is commercially available. For your convenience, all commercially available hardware and electrical components have been put in parts kits which can be ordered by part number 30734897-001 (electrical components - 1 each) and 30734892-001 (hardware - 10 each).
2. "(K)" denotes that the part number is for the parts kit in which the described part is included. The described part cannot be ordered separately.

Figure No. 1	Part No.	Description	Recom'd		Quantity	
			Spare	Parts	Unit	Kit
			10	100		
	30682256-TAB	19" wide door assembly (see table 1)				
	30682261-TAB	16" wide door assembly (see table 2)				
1	(K) 30734888-001	plate, identification			1	1
2	(K) 30734888-001	lens, door (see table 1 or 2) **				1
3	(K) 30734888-001	spring, compression			1	2
4	(K) 30734888-001	hinge pin			1	1
5	(K) 30734888-001	pin			1	2
6	(K) 30734888-001	gasket			1	1
7	(K) 30734888-001	gasket (16" wide door)			1	1
	(K) 30734888-001	gasket (19" wide door)			1	1
8	(K) 30734888-001	cover (when not using integrally mounted control chassis) **			1	1
9	30359838-001 *	screw #6 self tapping slotted hex hd. 1/4" **			2	
10	30682288-001	glass (12.67" x 8.12")			1	1
11	30736407-001	clip			5	
12	30359838-006 *	screw (see table 1 or 2)				
13	(K) 30734888-001	shaft (see table 1 or 2)				1
14	(K) 30734888-001	spring (see table 1 or 2)				1
15	(K) 30734888-001	bushing (see table 1 or 2)				1
16	30359838-001 *	screw #6 self tapping slotted hex. hd. 1/4"			2	
17	(K) 30734888-001	latch			1	1
18	30676792-001	lock assembly with two keys (see table 1 or 2) option				
19	(K) 30734888-001	key (see table 1 or 2)				2
20	30371348-001 *	washer (see table 1 or 2)				
21	30352213-000 *	lockwasher (see table 1 or 2)				
22	30356657-000 *	hex nut (see table 1 or 2)				
23	(K) 30734888-001	knob (see table 1 or 2)				1
24	(K) 30734888-001	set screw (see table 1 or 2)				2

** not part of door assembly 30682256-TAB, 30682261-TAB.

ELECTRONIK 112
16" AND 19" WIDE CASE AND DOOR
PARTS LIST

Section 714-69

TABLE 1 (19" WIDE DOOR)

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity Unit 30682256-								Kit
			10	100	001	002	003	004	005	006	007	008	
	30682256-001	door assembly w/o set point & lock			1	—	—	—	—	—	—	—	
	30682256-002	door assembly w/set point w/o lock			—	1	—	—	—	—	—	—	
	30682256-003	door assembly w/o set point w/lock			—	—	1	—	—	—	—	—	
	30682256-004	door assembly w/set point & lock			—	—	—	1	—	—	—	—	
	30682256-005	door assembly, multipoint w/o set point & lock			—	—	—	—	1	—	—	—	
	30682256-006	door assembly, multipoint w/set point w/o lock			—	—	—	—	—	1	—	—	
	30682256-007	door assembly, multipoint w/o set point w/lock			—	—	—	—	—	—	1	—	
	30682256-008	door assembly, multipoint w/set point & lock			—	—	—	—	—	—	—	1	
2	(K) 30734888-001	lens, door			—	—	—	—	1	1	1	1	1
12	30359838-001*	screw #6 self tapping slotted hex hd. 3/8"			5	5	7	7	5	5	7	7	
13	(K) 30734888-001	shaft			—	1	—	1	—	1	—	1	1
14	(K) 30734888-001	spring			—	1	—	1	—	1	—	1	1
15	(K) 30734888-001	bushing			—	1	—	1	—	1	—	1	1
18	30676792-001	lock assembly			—	—	1	1	—	—	1	1	
19	(K) 30734888-001	key			—	—	1	1	—	—	1	1	2
20	30371348-001*	washer .3281 ID x .875 OD x .0625 thk			—	1	—	1	—	1	—	1	
21	30352213-000*	lockwasher 5/16 internal tooth shake proof			—	1	—	1	—	1	—	1	
22	30356657-000*	hex nut 5/16—24 x 3/32 thk			—	1	—	1	—	1	—	1	
23	(K) 30734888-001	knob			—	1	—	1	—	1	—	1	1
24	(K) 30734888-001	set screw			—	1	—	1	—	1	—	1	2

TABLE 2 (16" WIDE DOOR)

			30682261-									
			001	002	003	004	005	006	007	008		
	30682261-001	door assembly w/o set point / lock	1	—	—	—	—	—	—	—		
	30682261-002	door assembly w/set point w/o lock	—	1	—	—	—	—	—	—		
	30682261-003	door assembly w/o set point w/lock	—	—	1	—	—	—	—	—		
	30682261-004	door assembly w/set point & lock	—	—	—	1	—	—	—	—		
	30682261-005	door assembly, multipoint w/o set point & lock	—	—	—	—	1	—	—	—		
	30682261-006	door assembly, multipoint w/set point w/o lock	—	—	—	—	—	1	—	—		
	30682261-007	door assembly, multipoint w/o set point w/lock	—	—	—	—	—	—	1	—		
	30682261-008	door assembly, multipoint w/set point & lock	—	—	—	—	—	—	—	1		
2	(K) 30734888-001	lens, door	—	—	—	—	1	1	1	1	1	1
12	30359838-001*	screw #6 self tapping slotted hex hd. 3/8"	5	5	7	7	5	5	7	7		
13	(K) 30734888-001	shaft	—	1	—	1	—	1	—	1	1	1
14	(K) 30734888-001	spring	—	1	—	1	—	1	—	1	1	1
15	(K) 30734888-001	bushing	—	1	—	1	—	1	—	1	1	1
18	30676792-001	lock assembly	—	—	1	1	—	—	1	1		
19	(K) 30734888-001	key	—	—	1	1	—	—	1	1	2	
20	30371348-001*	washer .3281 ID x .875 OD x .0625 thk	—	1	—	1	—	1	—	1		
21	30352213-000*	lockwasher 5/16 internal tooth shake proof	—	1	—	1	—	1	—	1		
22	30356657-000*	hex nut 5/16—24 x 3/32 thk	—	1	—	1	—	1	—	1		
23	(K) 30734888-001	knob	—	1	—	1	—	1	—	1	1	1
24	(K) 30734888-001	set screw	—	1	—	1	—	1	—	1	2	2

ELECTRONIK 112
16" AND 19" WIDE CASE AND DOOR
PARTS LIST

Section 714-69

Figure No. 2 Key No.	Part No.	Description	Recom'd Spare Parts Per	Quantity	
				Unit	Kit
			10 100		
1	30682284-001	19" wide case		1	
	30682285-001	16" wide case		1	
2	(K) 30734888-001	retaining ring		as req'd	4
3	(K) 30734888-001	latch		1	1
4	30368014-002	washer .2570 ID x .500 OD x .0156 thk		1	
5	(K) 30734888-001	spring		as req'd	2
6	30000005-004	screw 10-32 bdg. hd. 1/4"			
7	30677303-001	pneumatic drawbridge (see figure 3)		1	
8	(K) 30734888-001	retaining ring		as req'd	4
9	See Section 716-	drawbridge assembly (chassis)		1	
10	30000005-812	screw 8-32 bdg. hd. 3/4"		as req'd	
11	(K) 30734888-001	latch		1	1
12	(K) 30734888-001	catch		1	2
13	30000005-404	screw 4-40 bdg. hd. 1/4"		2	
14	30689980-002	pneumatic drawbridge (see figure 4)		1	
15	30000005-804	screw 8-32 bdg. hd. 1/4"		as req'd	
16	30682254-001	rear cover 16" wide case		1	
	30682255-001	rear cover 19" wide case		1	

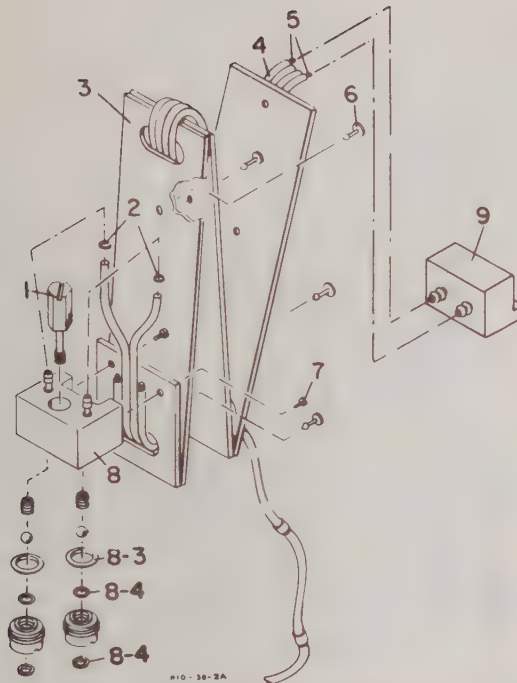


Figure 1. Drawbridge, Pneumatic Transmitter

IMPORTANT

1. An asterisked part number indicates that the described part is commercially available. For your convenience, all commercially available hardware and electrical components have been put in parts kits which can be ordered by part number 30734897-001 (electrical components - 1 each) and 30734892-001 (hardware - 10 each).
2. "(K)" denotes that the part number is for the parts kit in which the described part is included. The described part cannot be ordered separately.

Figure No. 1
Key No.

Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity	
			10	100	Unit	Kit
	30689980-001	drawbridge, pneumatic transmitter			1	
1	(K) 30735146-001	screw			1	1
2	(K) 30735146-001	retaining ring			4	4
3	(K) 30735146-001	drawbridge			1	1
4	(K) 30735146-001	tubing, ribbon			1	1
5	(K) 30735146-001	spring			2	1
6	(K) 30735146-001	clip button			5	2
7	30000006-505*	screw 6-32 bdg. hd. <i>5/16</i>			2	
8	30689976-001	quick disconnect			1	
8-3	30354697-512	"O" ring	1	2	2	
8-4	30354697-514	"O" ring	1	2	4	
9	30677335-001	block, customer connection			1	

MODEL 111/112 DRAWBRIDGES PARTS LIST

Section 715-53

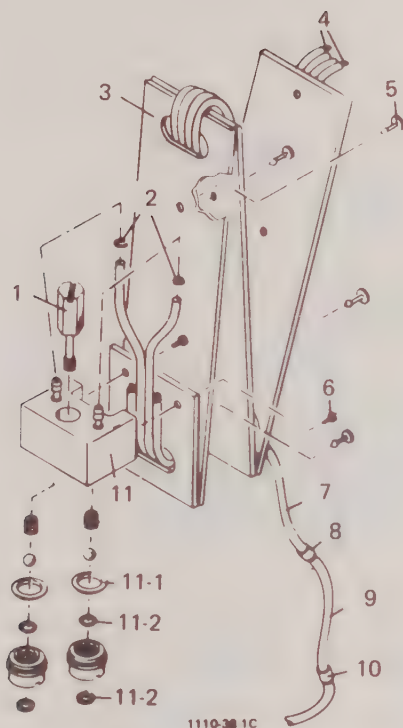


Figure 2. Drawbridge, Pneumatic Controller

Figure No. 2
Key No.

Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity	
			10	100	Unit	Kit
	30689980-002	drawbridge, pneumatic controller			1	
1	(K) 30735146-002	screw			1	1
2	(K) 30735146-002	retaining ring			2	4
3	(K) 30735146-002	drawbridge			1	1
4	(K) 30735146-002	spring			2	1
5	(K) 30735146-002	clip button			4	2
6	30000005-605*	screw 6-32 bdg. hd. 5/16"			2	
7	(K) 30735146-002	tubing ribbon			1	1
8	(K) 30735146-002	connector			4	2
9	(K) 30735146-002	tubing			2	1
10	(K) 30735146-002	tubing			2	1
11	30689976-001	quick disconnect			2	2
11-1	30354697-512	"O" ring	1	2	1	
11-2	30354697-514	"O" ring	1	2	2	

MODEL 111/112 DRAWBRIDGES
PARTS LIST
Section 715-53

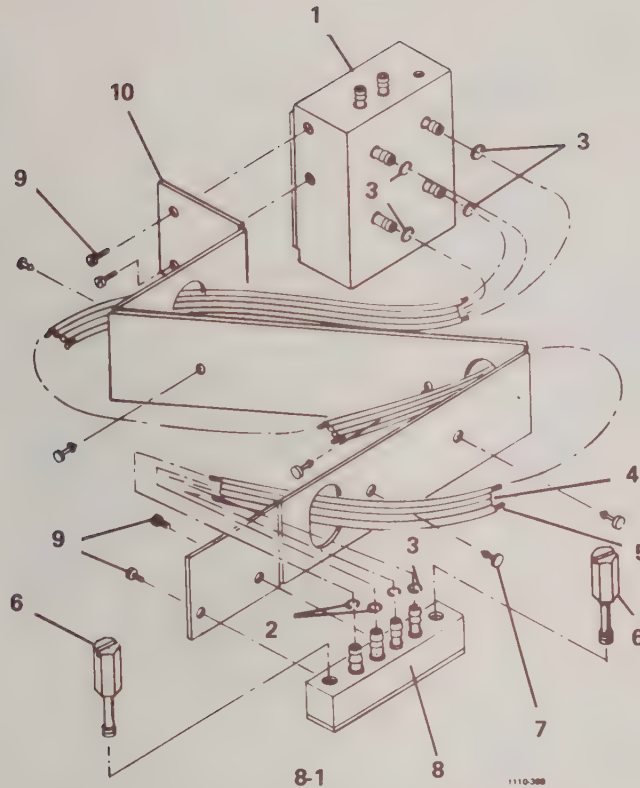


Figure 3. Drawbridge, Pneumatic Controller, Internally Mounted

Figure No. 3

Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity	
			10	100	Unit	Kit
	30677303-001	drawbridge, pneumatic controller internally mounted			1	
1	30677285-001	block assembly, cust. conn.			1	
2	(K) 30735146-003	retaining ring			4	4
3	(K) 30735146-003	retaining ring			4	4
4	(K) 30735146-003	tubing ribbon			1	1
5	(K) 30735146-003	spring			2	1
6	(K) 30735146-003	screw 8-32, connecting block			2	1
7	(K) 30735146-003	clip retaining			5	2
8	30677299-001	block connection assembly			1	
8-1	(K) 30735146-003	gasket			1	2
9	30000005-604*	screw 6-32 bdg. hd. 1/4"			4	
10	(K) 30735146-003	drawbridge			1	1

MODEL 111/112 DRAWBRIDGES
PARTS LIST

Section 715-53

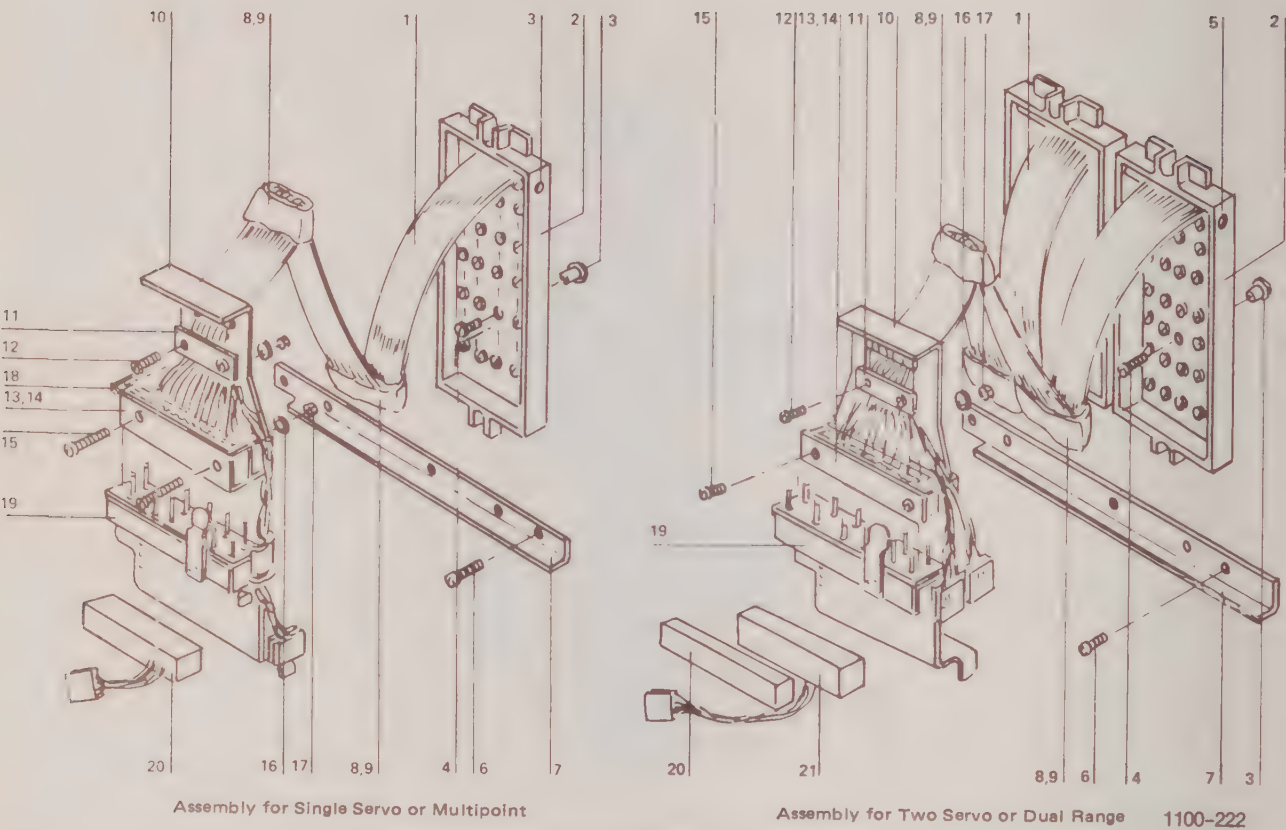


Figure 4. Instrument Drawbridge and Terminal Panel Assembly

Figure No. 4
and
Key No.

Part No.	Description	Recom'd Spare Parts		Quantity	
		Per 10	100	1 Servo	2 Servo
30736000-001	drawbridge & terminal panel assembly, one servo model 111/112 Dual Range or Select-O-Range multipoint			1	
30736000-002	drawbridge & terminal panel assembly, two servo or dual range — one pen model 111/112				1
1 30735983-001	ribbon cable ass'y			1	2
2 30676838-001	terminal panel			1	2
3 30676835-001	connector			9	14
4 30000005-803*	screws 8-32 bd. hd. 3/16" long			9	14
5 30735984-001	stress rod			1	2
6 30000005-810*	screw 8-32 bd. hd. 5/8" long			1	2
7 30676769-001	111 mtg. bracket			1	2
30682265-001	112 mtg. bracket			1	2
8 30735985-001	stress tube			2	1
30735985-002	stress tube			—	1
9	heat shrink tubing or tape				
10 30735987-001	bracket			1	1
11 30735986-001	cable clamp			1	1

MODEL 111/112 DRAWBRIDGES
PARTS LIST
Section 715-53

Figure No. 4 and Key No.	Part No.	Description	Recom'd Sapre Parts Per		Quantity	
			10	100	1 Servo	2 Servo
12	30000005-406*	screw bd. hd. 4-40 3/8" long			2	4
13	30735990-001	mounting adapter			2	2
14	30736214-001	label			1	1
15	30000008-418*	screw 4-40 fistr. hd. 1-1/8" long			2	2
16	30006945-000*	washer			1	2
17	30000015-440*	nut			2	2
18	30735994-120	spacer			1	—
19	30736001-001	connector ass'y — 1 servo			1	—
	30736001-002	connector ass'y — 2 servo			—	1
20	30736003-001	power cable ass'y			1	1
21	30735994-020	connector			—	1

Summary of Kit Contents
Kit No. 30735146-001

Figure No.	Key No.	Description	Qty.
1	1	screw	1
	2	retaining ring	4
	3	drawbridge	1
	4	ribbon tubing	1
	5	spring	1
	6	clip button	2
Kit No. 30735146-002			
2	1	screw	1
	2	retaining ring	4
	3	drawbridge	1
	4	spring	1
	5	clip button	2
	7	tubing ribbon	1
	8	connector	2
	9	tubing	1
	10	tubing	2
Kit No. 30735146-003			
3	2	retaining ring	4
	3	retaining ring	4
	4	tubing ribbon	1
	5	spring	1
	6	screw	2
	7	clip retaining	2
	8-1	gasket	2
	10	drawbridge	1

Model 111 & 112 Chassis Assembly

Parts List

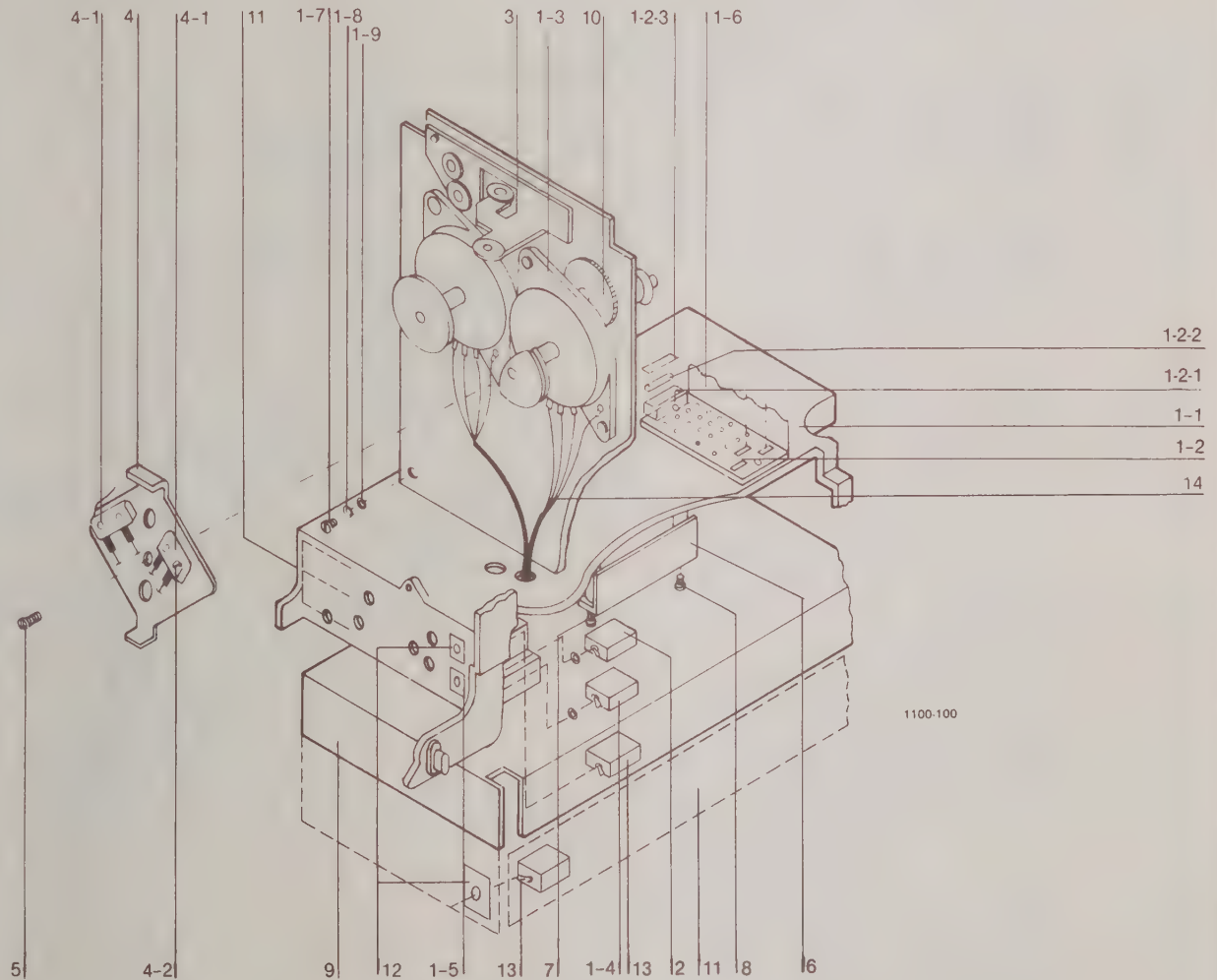


Figure 1 - Model 111/112 Chassis Assembly

FIGURE NO. 1

Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity	Kit
			10	100		
1	see table 1	chassis assembly			1	
1-1	30676843-001	basic chassis, class 111			1	
	30682263-001	basic chassis, class 112			1	
1-2	30735848-001	J2 terminal connector board one pen model 111 or 112. one pen with pulse or sync motor driven set point model 111 or 112			1	
	30735848-002	J2 terminal connector board two pen or one pen with servo motor driven set point model 111 or 112 multipoint model 111 or 112. one pen or multipoint Dual Range Model 111 or 112			1	
1-2-1	30731384-001	shroud				
1-2-2	30351949-003	fuse 1 amp Slo-Blo	1	2	1	
1-3-3	30735991-001	cover			1	
1-3	see Table 1	servo drive assembly (see Figure 2 for detail parts)				
1-4	30676832-004	power switch				
	(K)30734935-001	lockwasher			1	1
1-5	(K)30734935-001	nameplate (112)			1	1
1-6	30736000-item	terminal panel & drawbridge see Section 715-53			1	
1-7	30000005-810*	screw 8-32 bd. hd. 5/8"			2	
1-8	30009771-000*	lockwasher			2	
1-9	(K)30734935-001	washer			2	6
2		chart drive switches (see Section 753-XXX)			1	
3		gear mtg. plate assembly (motor drive set point) see section 763-34			1	
4	30682483-003	bracket and switch			1	
4-1	30676926-501	micro switch (Pkg of 4 switches)			1	
4-2	30000008-206	screw			4	
	(K)30734935-001	lockwasher			4	1
5	*30000012-804	screw 8-32 flat hd. 1/4"			1	
6	(K)30734935-001	cover			1	
7	*30000005-606	screw 6-32 bd. hd. 3/8"			1	
8	*30000005-603	screw 6-32 bd. hd. 3/16"			1	
9		recorder servo assemblies (see section 731-9)			1	
10		error generator motor driven set point see section 763-34				
11		Dual Range Amplifier (See Section 733-115)			1	
12	30751590-001	nameplate - Model 112			1	
	30751590-002	nameplate - Model 111			1	
13	30751585-001	dual range switch assembly (Model 112)			1	
	30751585-002	dual range switch assembly (Model 111)			1	
	30751585-003	dual range switch assembly (multipoint)			1	
14	30751583-001	signal cable assembly (multipoint)			1	
	30751583-002	signal cable assembly (single pen)			1	

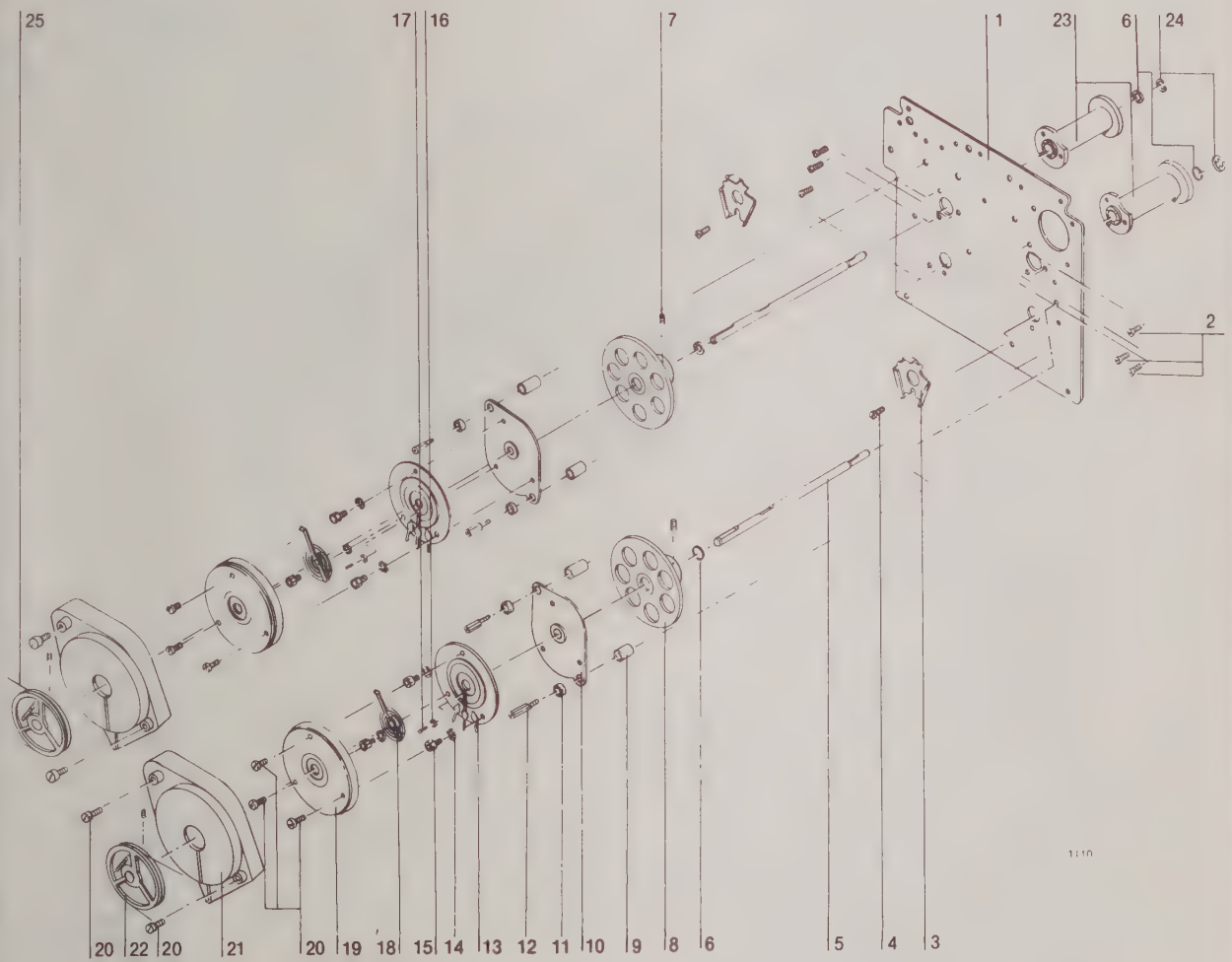


Figure 2 – Servo Drive Assembly

FIGURE NO. 2

Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity		
			10	100	1st Servo	2nd Servo	Kit
1	30676858-001	servo mtg. plate, class 111			1	1	
	30682264-001	servo mtg. plate, class 112			1	1	
2	*30000007-806	screw 8-32 fil. hd. 3/8"			3	6	
3	(K)30734936-001	stop			1	2	1
	30683794-001	stop (multipoint)			1	-	
4	*30000012-804	screw 8-32 bd. hd. 1/4"			1	2	
	30000005-808	screw 8-32 bd. hd. 1/2" (multipoint)			1	-	
	30009771-000	lockwasher (multipoint only)			1	-	
5		servo drive shaft, see Table 1			1	-	
		servo drive shaft, see Table 1			-	1	
6	(K)30734936-001	thrust washer			2	4	4
7	(K)30734936-001	set screw			2	4	4
8	30676850-001	bull gear (not used w/clutch)			1	2	
	30683788-item	bull gear (multipoint) see Figure 3			1	-	
	30732596-001	bull gear (model 112 motor driven set point only)			1	-	
9	(K)30734936-001	spacer			2	4	1
	30676828-003	spacer (multipoint)			2	-	
10	(K)30734936-001	mtg. plate			1	2	1
11	(K)30734936-001	collar			2	4	2
12	(K)30734936-001	stud			2	4	2
13	30683380-001	conductive plastic element	2	4	1	2	
14	(K)30734936-001	lockwasher			3	6	6
15	(K)30734936-001	stud			3	6	1
16	(K)30734936-001	washer			1	2	6
17	30000005-202	screw 2-56 binding head			1	2	
18	30677501-501	slidewire contact arm	2	4	1	2	
19	30676930-001	dust cover assembly			1	2	
20	30000005-403	screw 4-40 bd. hd. 3/16"			3	5	
21	30677505-001	insulating cover			1	2	
22	30676846-001	cable drum, class 111			1	1	
	30682266-001	cable drum, class 112			1	1	
23	30676855-001	bearing housing			1	2	
24	30371339-210	retaining ring			1	2	
25		Servo Drive Cable (see below)	1	4			
	30676862-001	class 111 strip chart #1 pen			1	-	
	30676862-002	class 111 strip chart #2 pen			-	1	
	30676862-001	class 111 strip chart multipoint			1	-	
	30676862-004	class 111 circular chart #1 pen			1	-	
	30676862-005	class 111 circular chart #2 pen			-	1	
	30676862-007	class 112 #1 pen			1	-	
	30676862-008	class 112 #2 pen			-	1	
	30676862-008	class 112 multipoint			1	-	

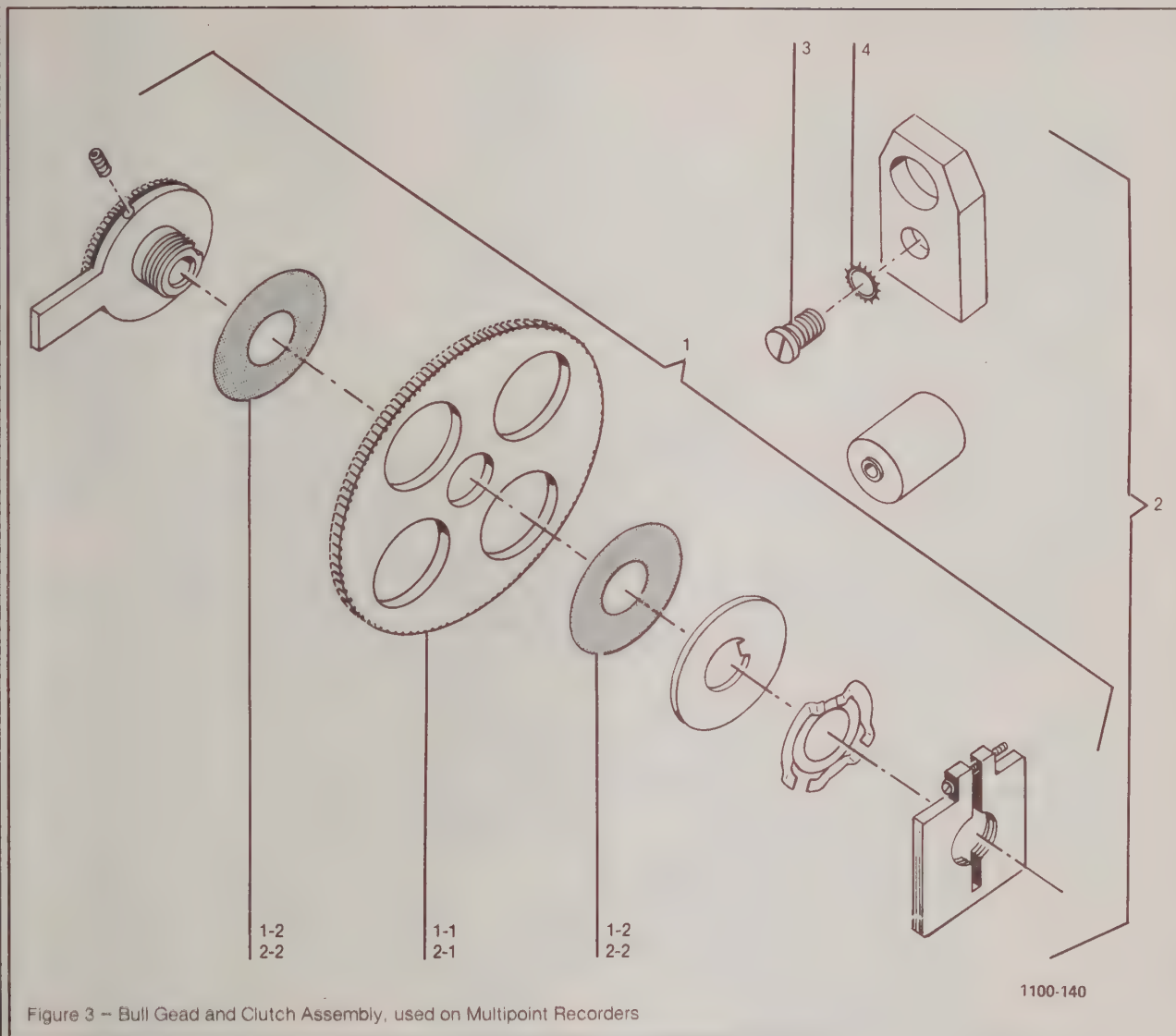


FIGURE NO. 3

Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity
			10	100	
1	30683788-501	replacement bull gear and clutch			1
2	30683788-502	conversion to new design bull gear and clutch assembly			1
1-1 2-1	30676848-002	bull gear			1
1-2 2-2	30683789-501	friction washer (clutch) 8-pack	1	2	1
3	30000005-808*	screw 8-32 bd. hd. 1/2"			1
4	30009771-000*	lockwasher #8 serrated			1

*commercially available parts, buy locally

TABLE 1

Description	Figure No. 1 Key No. 1 Chassis Ass'y	Figure No. 1 Key No. 1-3 Servo Drive Ass'y	Figure No. 2 Key No. 5 Servo Drive Shaft
Model 111 One Pen	30676914-005	30676844-001	30679098-001
Model 111 One Pen-Dual Range	30676914-009	30676844-001	30679098-001
Model 111 Two Pen or One Pen with Motor Driven Set Point	30676914-006	30676844-002	30679098-001 30679098-001
Model 111 One Pen with Pulse or Syncr. Motor Driven Set Point	30676914-007	30676844-006	30679098-001 30679098-001
Model 112 One Pen	30682431-005	30676844-003	30679098-002
Model 112 One Pen-Dual Range	30682431-009	30676844-003	30679098-002
Model 112 Two Pen or One Pen with Motor Driven Set Point	30682431-006	30676844-005	30679098-001 30679098-002
Model 112 One Pen with Pulse Syncr. Motor Drive Set Point	30682431-008	30676844-008	30679098-001 30679098-002
Model 111 Multipoint	30676914-008	30676844-007	30679098-001
Model 111 Multipoint-Dual Range/Select-O-Range	30676914-010	30676844-007	30679098-001
Model 111 Multipoint	30682431-007	30676844-009	30679098-002
Model 112 Multipoint-Dual Range/Select-O-Range	30682431-010	30676844-009	30679098-002

IMPORTANT:

1. An asterisked part number indicates that the described part is commercially available. For your convenience all commercially available hardware and electrical components have been put in parts kits which can be ordered by numbers 30734892-001 (hardware) and 30734897-001 (electrical components)
2. "(K)" denotes that the part number is for the parts kit in which the described part is included. The described part cannot be ordered separately

SUMMARY OF KIT CONTENTS

Kit No. 30734935-001

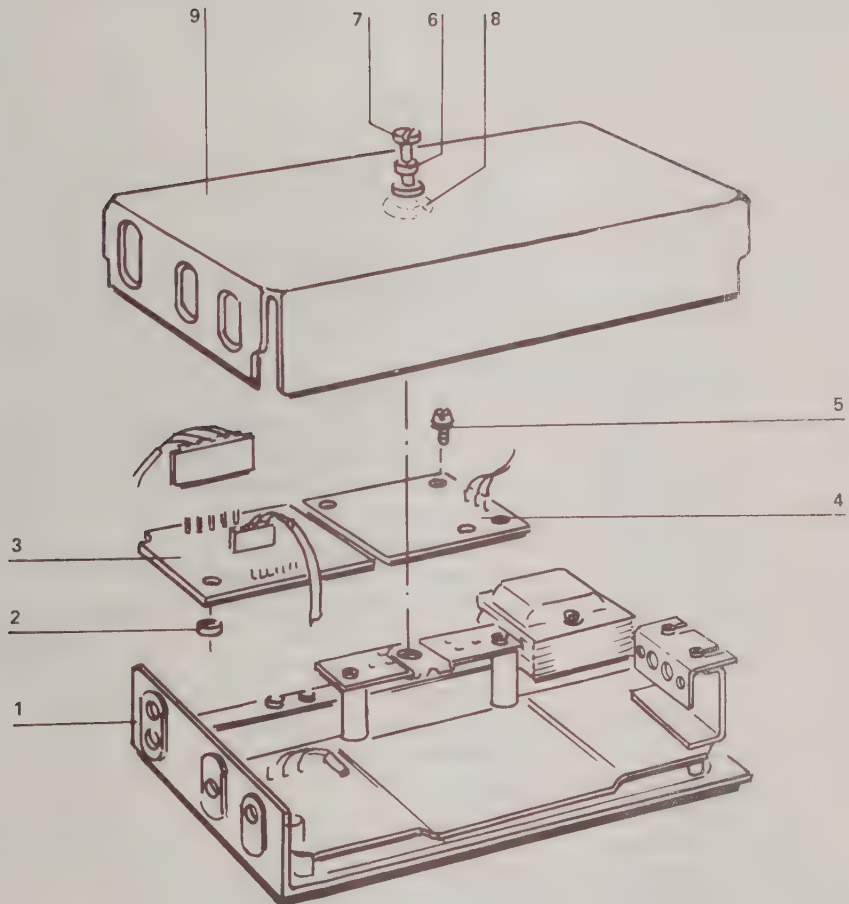
Figure No.	Key No.	Description	Qty.
1	1-4	shoulder screw	2
	1-5	plug housing	1
	1-9	lockwasher	6
	4-2	lockwasher	1
	6	cover	1

Kit No. 30734936-001

2	14	stop	1
	17	thrust washer	3
	18	set screw	4
	20	spacer	1
	21	mtg. plate	1
	22	collar	2
	23	stud	2
	25	lockwasher	6
	26	stud	1
	27	washer	6

ELECTRONIK 111 & 112
SERVO PACKAGE
PARTS LIST

Section 731-9, Issue 1



Servo Package

731-0009-110

Printed in U.S.A. — 11/78

ELECTRONIK 111 & 112
SERVO PACKAGE
PARTS LIST

Section 731-9

IMPORTANT

1. An asterisked part number indicates that the described part is commercially available. For your convenience, all commercially available hardware and electrical components have been put in parts kits which can be ordered by part number 30734897-001 (electrical components - 1 each) and 30734892-001 (hardware - 10 each).
2. "(K)" denotes that the part number is for the parts kit in which the described part is included. The described part cannot be ordered separately.

Figure No. 1 Key No.		Part No.	Description	Recom'd Spare Parts Per		Quantity	
				10	100	Unit	Kit
1		30679257-502	amplifier assembly, single end (see Section 742-40)			1	
		30679256-503	amplifier assembly, push-pull (see Section 742-41)			1	
2	(K)	30734891-001	spacer			1	4
3		30370790-999	measuring circuit unit for T.C. M.V., D.C., Volt tachometer, D.C. current & radiamatic actuations			1	
		30370791-999	measuring circuit unit for resistance thermometer			1	
3-1		30682793-001	zero adjustment pot (not shown)			1	
3-2		30682793-002	span adjustment pot (not shown)			1	
3-3	(K)	30734891-001	pot mtg. bkt. (not shown)			1	2
3-4	(K)	30734891-001	nylon screw for mtg. bkt.			1	4
4		30372970-501	constant voltage unit, resistance thermometer actuation			1	
		30372971-501	constant voltage unit, all other actuations except conductivity			1	
5	(K)	30734891-001	screw			as req'd	6
6	(K)	30734891-001	bearing, snap in			1	4
7	(K)	30734891-001	stud, 1/4 turn fastener			1	2
8	(K)	30734891-001	retainer			1	4
9		30679183-001	cover			1	

ELECTRONIK 111 & 112 AMPLIFIER ASSEMBLY (SINGLE END) PARTS LIST

Section 742-40, Issue 1

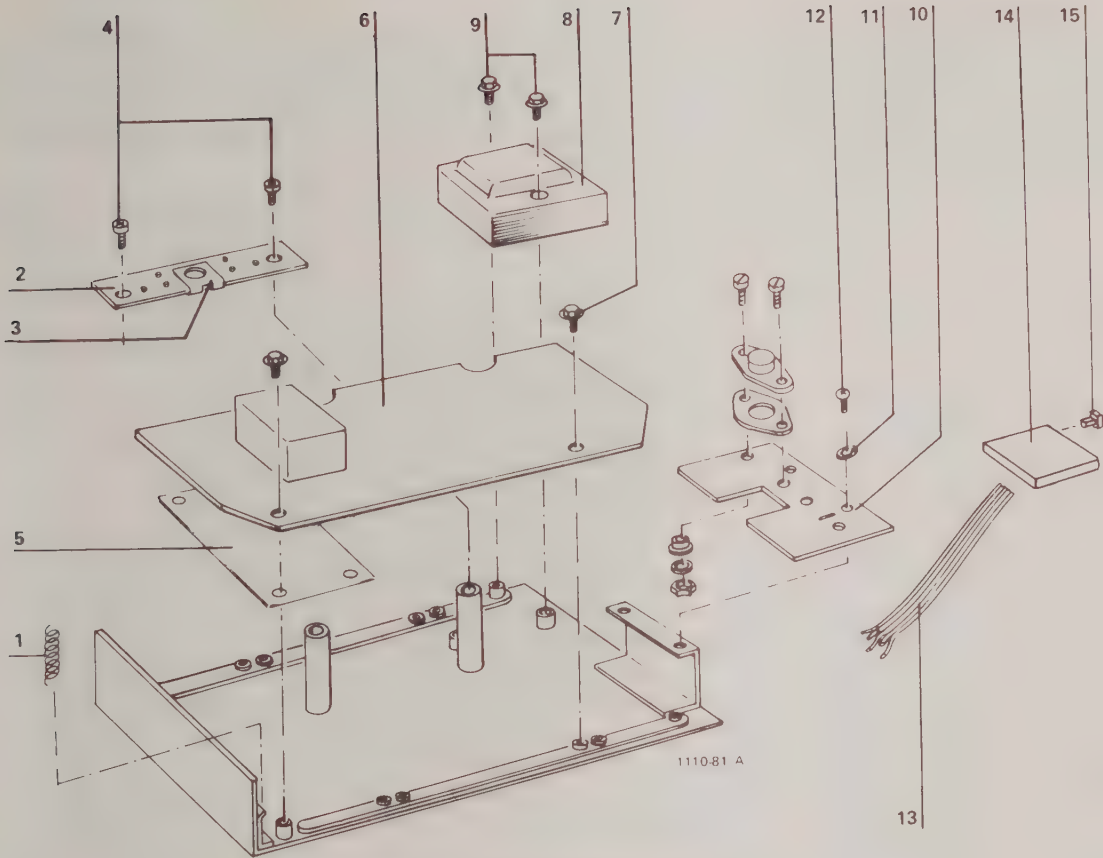


Figure 1. Amplifier Assembly (Single End)

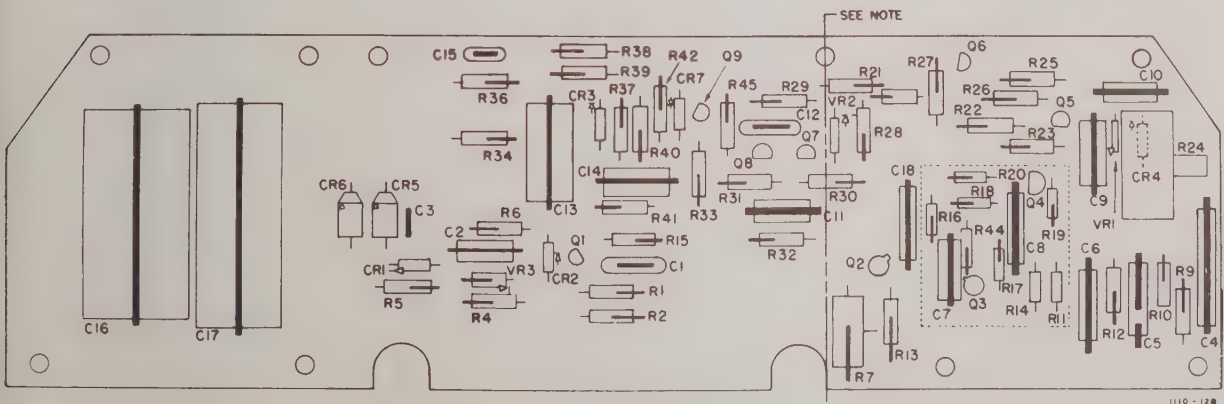


Figure 2. Amplifier Board Assembly.

NOTE: All components to the right of the dotted line not replaceable, varnished in place.

ELECTRONIK 111 & 112
AMPLIFIER ASSEMBLY (SINGLE END)
PARTS LIST

Section 742-40

IMPORTANT

1. An asterisked part number indicates that the described part is commercially available. For your convenience, all commercially available hardware and electrical components have been put in parts kits which can be ordered by part number 30734897-001 (electrical components - 1 each) and 30734892-001 (hardware - 10 each).
2. "(K)" denotes that the part number is for the parts kit in which the described part is included. The described part cannot be ordered separately.

Figure No. 1 & 2 Key No. Part No. Description			Recom'd Spare Parts Per		Quantity Unit	Kit
			10	100		
			1	2		
	30679257-502	amplifier assembly, single end	1	2	1	
1	(K) 30734979-001	spring			1	5
2	(K) 30734979-001	plate			1	3
3	(K) 30734979-001	receptacle, clip on			1	3
4	(K) 30734979-001	screw			2	10
5	(K) 30734979-001	insulator			1	3
6	30676602-501	amplifier board assembly (see figure 2)			1	
7	(K) 30734979-001	screw			4	8
8	30676607-001	power transformer assembly			1	
9	(K) 30734979-001	screw			2	4
10	30679203-001	heat sink assembly			1	
11	(K) 30734979-001	screw			2	4
12	30006583-000*	lockwasher .141 ID x .188 OD x .031 wall			2	
13	30676610-002	cable assembly			1	
	30676602-501	board assembly, amplifier	1	2	1	
14	30683190-020	connector			1	
15	30683183-001	dummy plug			1	
C1,C3	30723425-001*	capacitor, .1 μ f, $\pm$ 20%, 200V metalized plastic			2	
C2	30687003-008*	capacitor 68 μ f, $\pm$ 10%, 35V electrolytic tantalum			1	
C14	30374391-294*	capacitor 1 μ f, $\pm$ 20%, 20V electrolytic tantalum			1	
C11	30687003-006*	capacitor 10 μ f, $\pm$ 20%, 10V electrolytic tantalum			1	
C12	30366457-002*	capacitor .01 μ f, $\pm$ 20%, 500V ceramic dielectric			1	
C13	30658402-006*	capacitor 100 μ f, $\pm$ 100 - 10%, 25V electrolytic, alum oxide			1	
C15	30374136-001*	capacitor .001 μ f, 25V ceramic dielectric			1	
C16	30723345-001*	capacitor 1 μ f, $\pm$ 20%, 330V metalized paper			1	
C17	30723410-001*	capacitor 130 μ f, $\pm$ 50-10%, 15V electrolytic, alum oxide NP			1	
CR1,CR2, CR3,CR7	30723408-010*	diode 1N459			4	
CR5, CR6	30723408-002*	diode 1N2069			2	

NOTE: All components to the right of the dotted line in Figure 1 are not replaceable, varnished in place.

ELECTRONIK 111 & 112
AMPLIFIER ASSEMBLY (SINGLE END)
PARTS LIST

Section 742-40

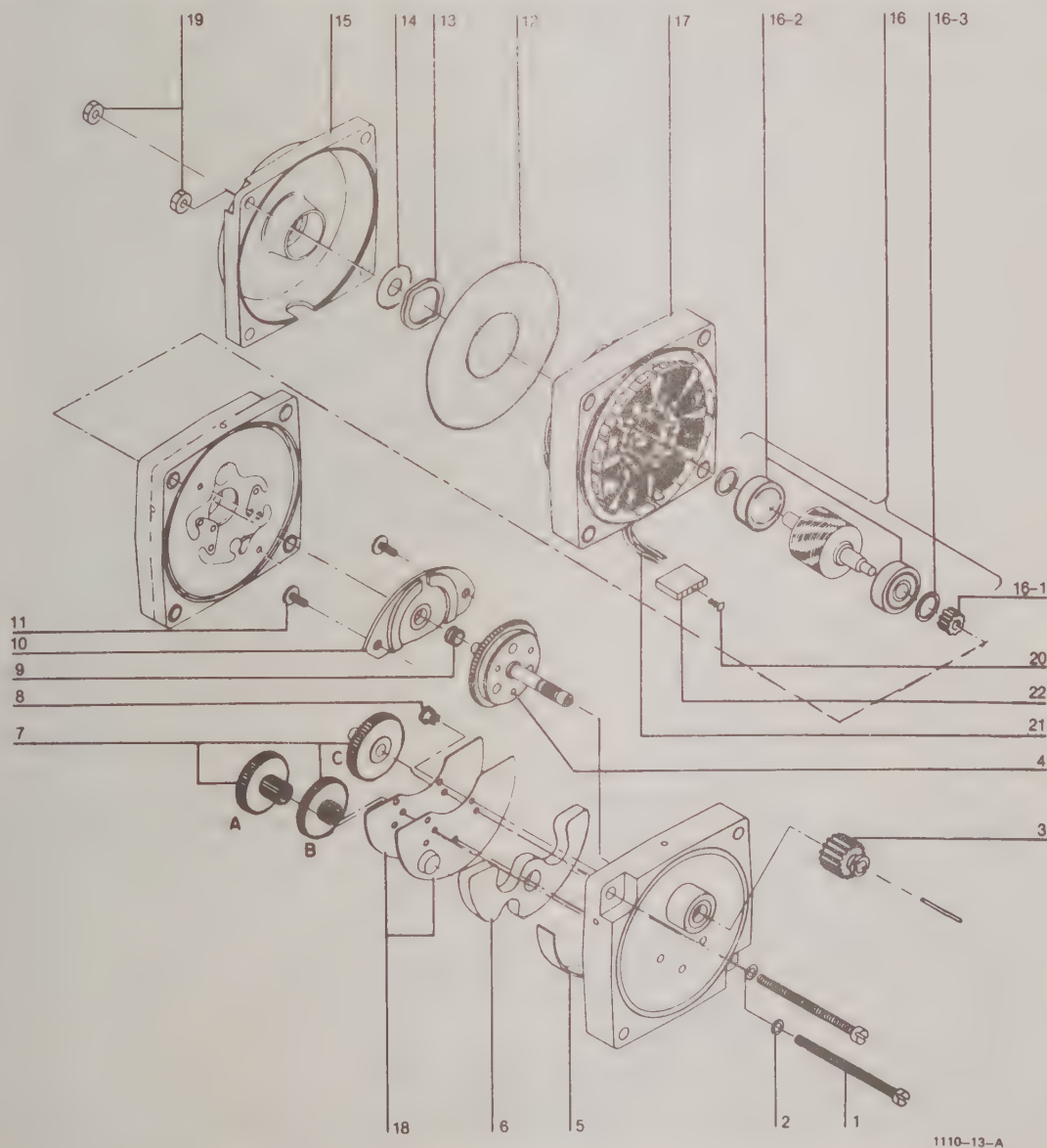
Figure No. 2

Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity Unit
			10	100	
Q1,Q9	30723626-036*	transistor 2N3702			2
Q7,Q8	30723626-025*	transistor 2N3391			2
R1	30000210-273*	resistor 27K, +10%, 1/2w			1
R2	30000210-562*	resistor 5.6K, +10%, 1/2w			1
R4	30000205-223*	resistor 22K, +5%, 1/2w			1
R5	30000210-222*	resistor 2.2K, +10%, 1/2w			1
R6,R41	30000210-560*	resistor 56 Ω , +10%, 1/2w			2
R37,R45	30000210-103*	resistor 10K, +10%, 1/2w			2
R15	30000210-105*	resistor 1 MEG, +10%, 1/2w			1
R42	30000210-821*	resistor 820K, +10%, 1/2w			1
R31	30000210-224*	resistor 220K, +10%, 1/2w			1
R29,R36	30000210-104*	resistor 100K, +10%, 1/2w			2
R32	30000210-102*	resistor 1K, +10%, 1/2w			1
R33	30000210-683*	resistor 68K, +10%, 1/2w			1
R34	30000210-564*	resistor 560K, +10%, 1/2w			1
R38	30000210-561*	resistor 560 Ω , +10%, 1/2w			1
R39	30000210-152*	resistor 1.5K, +10%, 1/2w			1
R40	30000210-183*	resistor 18K, +10%, 1/2w			1
VR3	30369764-021*	diode 1N963B			1

NOTE: All components to the right of the dotted line not replaceable, varnished in place.

Model 111 & 112 Servo Balancing Motor

Parts List



IMPORTANT:

1. An asterisked part number indicates that the described part is commercially available. For your convenience, all commercially available hardware and electrical components have been put in parts kits which can be ordered by part number 30734897-001 (electrical components - 1 each) and 30734892-001 (hardware - 10 each).
2. "(K)" denotes that the part number is for the parts kit in which the described part is included. The described part cannot be ordered separately.

FIGURE 1

Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity	
			10	100	Unit	Kit
	30676665-item	Servo balancing motor (see Table 3)	0	1	1	
	30735501-item	Servo balancing motor (accelerated Select-O-Print mechanical multipoint only (see Table 3)	0	1	1	
1	30000080-032*	screw 10-32, fil. hd. 2"		-	2	
2	30000925-000*	lockwasher #10 .249 OD X .194 ID X .040 wall			2	
3	(K) 30735143-001	output pinion			1	1
4	30362430-506	output shaft and gear			1	
	30362429-003	output shaft (used on 30676665-513 only)				
5	(K) 30735143-001	oil wick			1	2
	(K) 30735143-001	oil wick (used on 30676665-511 only)				2
6	(K) 30735143-001	oil wick			1	2
7	see Table 2	change gears A, B, C			as req'd	
8	(K) 30735143-001	fastener for wick retainer (30676665- all and 307355501-511)			1	4
9	(K) 30735143-001	spacer			1	2
10	(K) 30735143-001	bearing plate			1	1
	(K) 30735143-001	bearing plate (used on 30676665-513 only)				1
11	(K) 30735143-001	screw 6-32 bd. hd. 5/16"			2	2
12	(K) 30735143-001	insulator			1	2
13	(K) 30735143-001	spring washer			1	2
14	(K) 30735143-001	shim washer			as req'd	5
15	(K) 30735143-001	bearing housing			1	1
16	see Table 1	armature			1	
16-1	see Table 1 & 2	armature output pinion			1	
16-2	(K) 30735143-001	bearing			2	1
16-3	(K) 30735143-001	washer			2	1
17	see Table 1	stator assembly			1	
18	see Table 1	wick retainer			2	
19	30005966-000*	hex nut (10-32)			2	
20	see Table 1	cable assembly			1	
21	30683190-020	connector (used on 30676665-item only)			1	
22	30683183-001	dummy plug (used on 30676665-item only)			1	

TABLE 1 - Variable Detail Parts for Servo Motor

Key	Part Number	Description	Motor 30676665-5XX								Motor 30735501-5XX		Kit Qty
			509	510	511	512	513	514	515	516	511	512	
16	30362416-501	armature	1			1		1		1	1		
	30362416-504	armature					1						
	30362416-505	armature		1					1				
	30362416-507	armature			1							1	
16-1	(K) 30735143-001	armature pinion	1			1		1		1	1		1
	(K) 30735143-001	armature pinion		1					1				1
	(K) 30735143-001	armature pinion			1							1	1
	(K) 30735143-001	armature pinion					1						1
17	30362407-005	stator assembly	1	1		1							
	30362407-008	stator assembly			1								
	30362407-013	stator assembly					1	1	1	1			
	30362407-014	stator assembly									1		
	30362407-015	stator assembly										1	
18	(K) 30735143-001	wick retainer	2	2			omit	2	2				2
	(K) 30735143-001	wick retainer			2	2				2	2	2	2
20	30370296-004	cable assembly			1		1	1	1	1			
	30370269-007	cable assembly	1	1		1							
	30370296-005	cable assembly										1	
	30370296-008	cable assembly									1		

TABLE 2 - Change Gears and Armature Pinion

Motor Number 30676665-		30735501-	Gear Ratio	Gear "A" & No. of Teeth	Gear "B" & No. of Teeth	Gear "C" & No. of Teeth	Armature Pinion
509	514		10:1	omit	omit	(K) 30735144-001 35T & 34T	(K) 30735144-001 15T
510	515		30:1	(K) 30735144-001 42T & 12T	30364784-000 44T & 28T	(K) 30735144-001 28T	(K) 30735144-001 11T
511		511	1.92:1	omit	(K) 30735144-001 54T & 38T	omit	(K) 30735144-001 22T
512	516	512	5.83:1	omit	omit	30676750-001 35T & 24T	(K) 30735144-001 15T
513			4.4:1	omit	omit	omit	(K) 30735144-001 10T

TABLE 3 - Servo Balancing Motor

Table I or Table II Selection	Process Multipoint	Circular Chart and Scale	One or Two Pen Strip Chart Recorder	
	Model 1117/1127		Model 1113	Model 1123
12XXX	30676665-516	30676665-515	30676665-515	30676665-515
22XXX	30676665-516	30676665-515	30676665-515	30676665-515
32XXX	30676665-516	30676665-515	30676665-515	30676665-515
42XXX	30676665-512	30676665-510	30676665-510	30676665-510
52XXX	30676665-512	30676665-510	30676665-510	30676665-510
62XXX	30676665-512	30676665-510	30676665-510	30676665-510
13XXX	30676665-516	30676665-514	30676665-514	30676665-514
23XXX	30676665-516	30676665-514	30676665-514	30676665-514
33XXX	30676665-516	30676665-514	30676665-514	30676665-514
43XXX	30676665-512	30676665-509	30676665-509	30676665-509
53XXX	30676665-512	30676665-509	30676665-509	30676665-509
63XXX	30676665-512	30676665-509	30676665-509	30676665-509
14XXX	30676665-516	30676665-513		
25XXX			30676665-513	30676665-511
30XXX	30676665-516			
1AXXX	30735501-512			
2AXXX	30735501-512			
3AXXX	30735501-512			
4AXXX	30735501-511			
5AXXX	30735501-511			
6AXXX	30735501-511			
XBXXX	30735501-512			

Motor Driven Set Point Feature

Table II Selection	Motor Part Number
42090	30676665-509
42100	30676665-509
42270	30676665-509
43090	30676665-510
43100	30676665-510
43270	30676665-510

Model 112 Chart Transport Assembly

Parts List

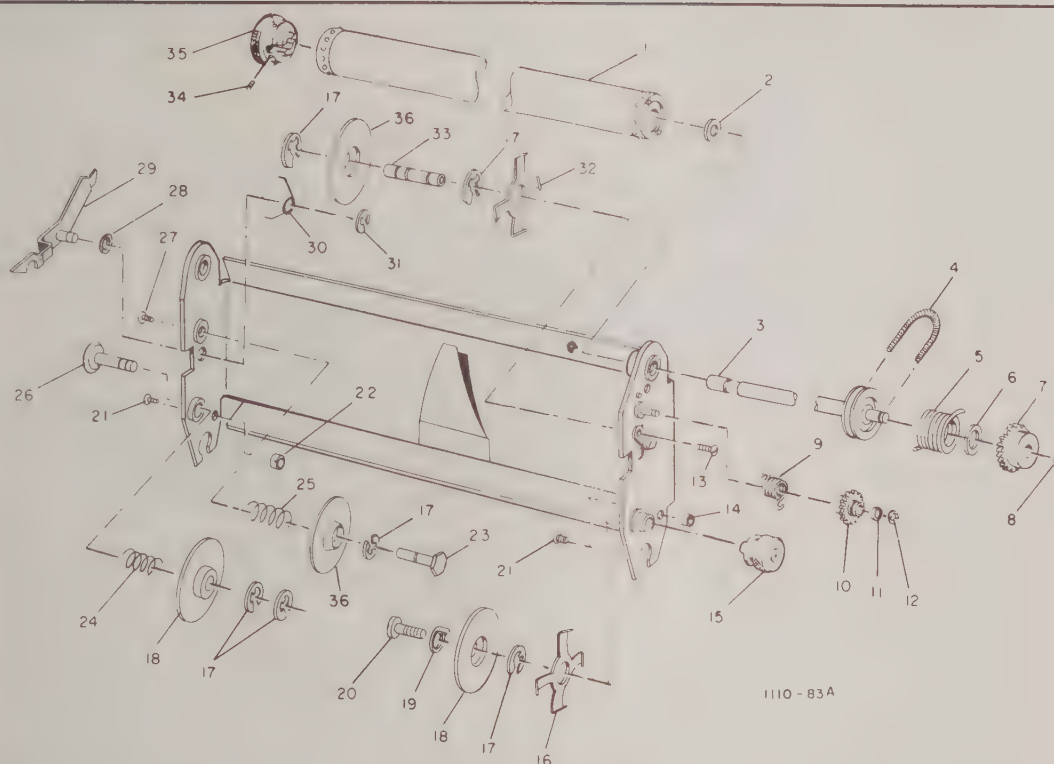


Figure 1 — Chart Transport

IMPORTANT

1. An asterisked part number indicates that the described part is commercially available. For your convenience, all commercially available hardware and electrical components have been put in parts kits which can be ordered by part number 30734897-001 (electrical components - 1 each) and 30734892-001 (hardware - 10 each).
2. "(K)" denotes that the part number is for the parts kit in which the described part is included. The described part cannot be ordered separately.

FIGURE NO. 1

Key	Part	Description	Recom'd Spare Parts Per		Quantity	
			10	100	Unit	Kit
	30679191-001	chart transport assembly (recorder & elec. multipoint)			1	
	30679191-002	chart transport assembly (mech. multipoint)			1	
1	30674204-001	drum assembly			1	
	30674204-002	drum assembly (mechanical multipoint)			1	
2	30006532-000*	spacer 255 ID x 50 OD x .062 thk			1	
3	30676588-002	shaft assembly	1	2	1	

FIGURE NO. 1

Key	Part	Description	Recom'd Spare Parts Per		Quantity	
			10	100	Unit	Kit
4	30723382-502	garter spring			1	
5	(K)30735145-002	clutch spring			1	1
6	(K)30735145-002	tubing, friction			1	1
7	(K)30735145-002	clutch gear			1	1
8	(K)30735145-002	retaining ring			1	4
9	(K)30735145-002	spring, brake				1
10	(K)30735145-002	gear			1	1
11	30006885-000*	washer .1285 ID x 2188 OD x .0312 thk			1	
12	30079208-000*	cotter			1	
13	30000009-603*	screw 6-32 rd. washer hd. 3/16"			1	
14	(K)30735145-002	stop			1	1
15	(K)30735145-002	pulley assembly			1	1
16	(K)30735145-002	spring, disc			1	1
17	(K)30735145-002	retaining ring			6	4
18	(K)30735145-002	disc, reroll			2	1
19	(K)30735145-002	washer, key			1	2
20	30000011-804*	screw 8-32 hex hd. 1/4"			1	
21	(K)30735145-002	screw			2	2
22	(K)30735145-002	stop			1	1
23	(K)30735145-002	pin			1	1
24	(K)30735145-002	thrust spring, left-hand			1	1
25	(K)30735145-002	thrust spring, right-hand			1	1
26	(K)30735145-002	shaft, grooved			1	1
27	(K)30735145-002	screw			1	1
28	(K)30735145-002	washer			1	2
29	(K)30735145-002	latch assembly			1	1
30	(K)30735145-002	spring, latch			1	1
31	30040283-000*	cotter .500 OD x .0156 wall			1	
32	(K)30735145-002	spring, disc			1	1
33	(K)30735145-002	pin			1	1
34	30677073-807*	set screw 8-32 spline socket cup point 7/16"			1	
35	(K)30735145-002	knob			1	1
36	30680294-003	holder, supply roll			1	
	30680294-004	holder, supply roll			1	

Model 111 & 112 Strip Chart Side Plates & Chart Drive Assembly

Parts List

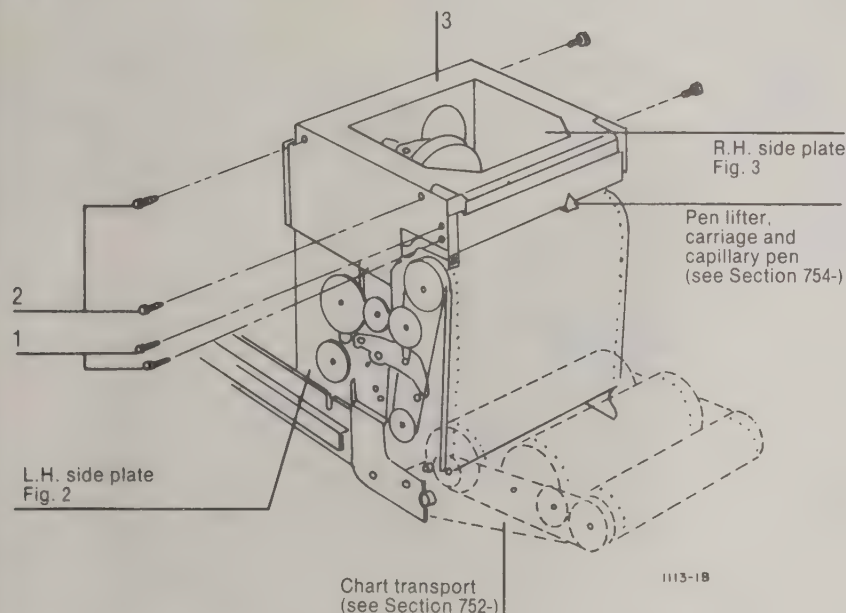


Figure 1 - Display package

IMPORTANT:

1. An asterisked part number indicates that the described part is commercially available. For your convenience, all commercially available hardware and electrical components have been put in parts kits which can be ordered by part numbers 30734892-001 (hardware) and 30734897-001 (electrical components).

2. "K" denotes that the part number is for the parts kit in which the described part is included. The described part cannot be ordered separately.

FIGURE NO. 1

Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity Per	
			10	100	Unit	Kit
	30676773-TAB	lefthand side plate assembly (see Figure 2)			1	
	30676774-TAB	right hand side plate assembly (see Figure 3)			1	
1	30000007-603*	screw 6-32 flat hd. 3/16"			2	
2	30000007-604*	screw 6-32 flat hd. 1/4"			4	
3	30676891-001	chassis cover (111)			1	
4	30682269-001	chassis cover (112)			1	

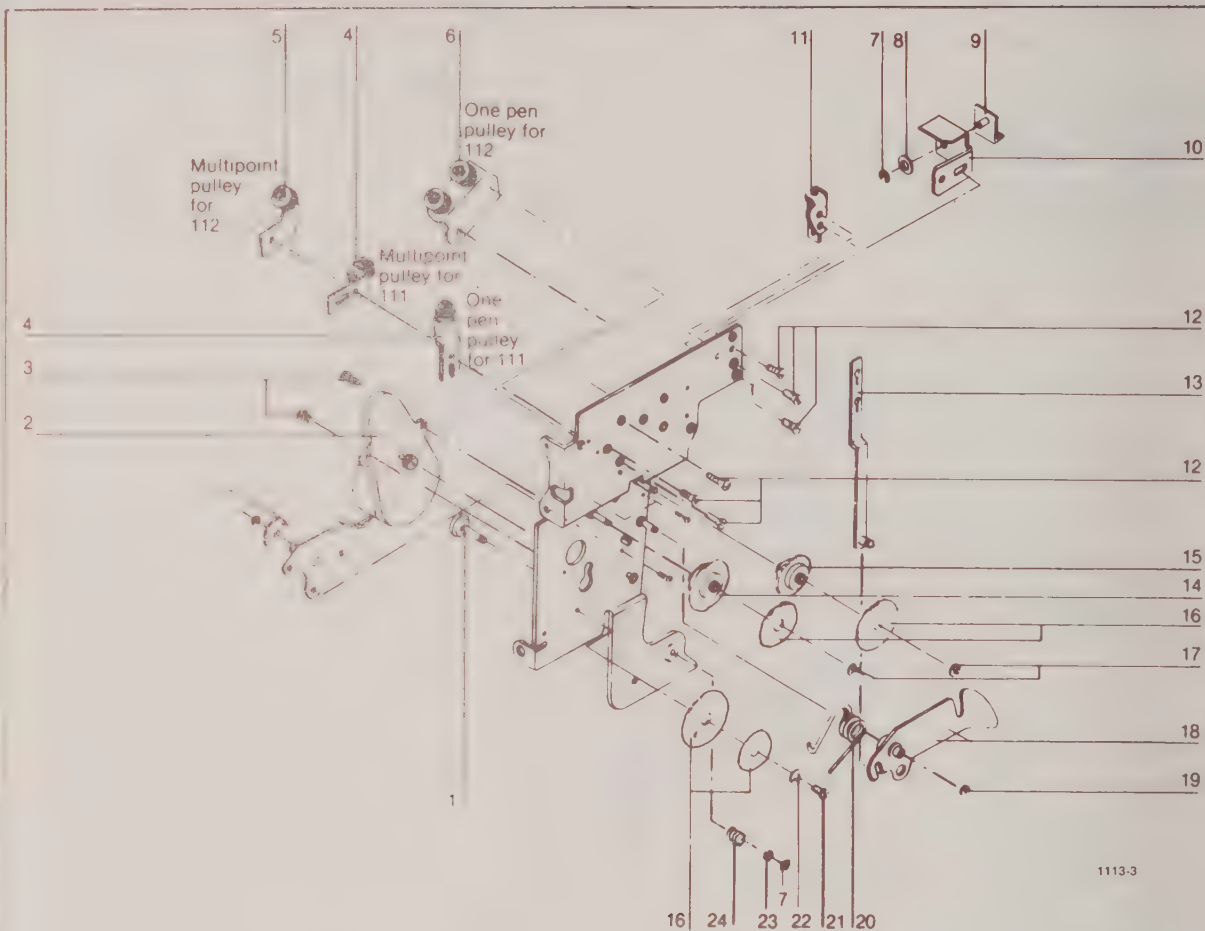


Figure 2 - Left hand side plate assembly

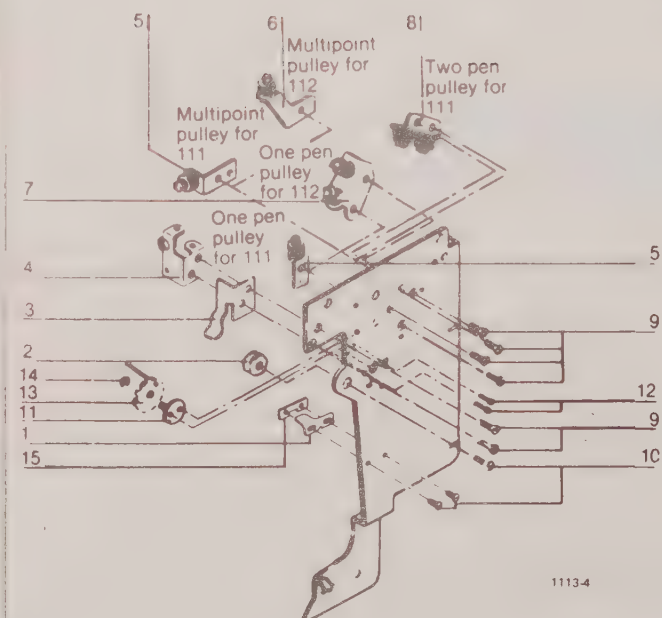


Figure 3 - Right hand side plate assembly

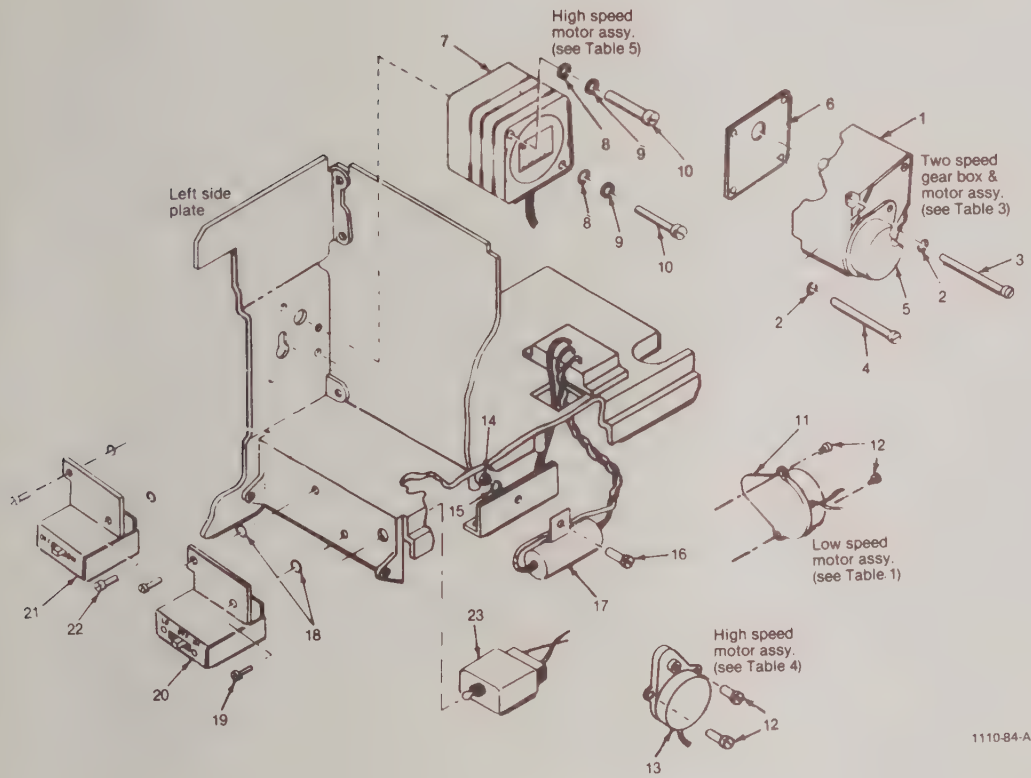


Figure 4 – Chart Drive Motors

FIGURE NO. 2 — Left Hand Side Plate

Key No.	Part No.	Description	Recom'd Per Spare Parts		Quantity Per						Kit
			10	100	Unit	30676773-					
					001	004	005	006	007		
	30676773-001	LH side plate — one & two servo 111			1						
	30676773-004	LH side plate & one servo 112				1					
	30676773-005	LH side plate — multipoint 112					1				
	30676773-006	LH side plate — mech. multipoint 111						1			
	30676773-007	LH side plate — mech. multipoint 112							1		
1	(K)30734830-001	pin			1	1	1	1	1	1	
2	see Figure 4	chart drive motor	1	2	1	1	1	1	1		
3	30000005-403*	screw 4-40, bdg. hd. 3/16"			2	2	2	2	2		
4	(K)30734833-001	bracket assembly with pulley			1	—	—	1	—	1	
5	(K)30734832-001	bracket assembly with pulley			—	—	1	—	1	1	
6	(K)30734832-001	bracket assembly with pulley			—	1	—	—	—	1	
7	(K)30734830-001	retaining ring			1	1	1	1	1	1	
8	(K)30734832-001	spring washer				—	1	—	—	4	
9	(K)30734832-001	mounting plate assembly			—	—	1	—	1	1	
10	(K)30734832-001	bracket					1	—	—	1	
11	(K)30734831-001	latch bracket			—	—	—	1	1	1	
12	30000012-603*	screw 6-32 flt. hd. 3/16"			1	2	3	3	3		
13	(K)30734831-001	lever			1	1	—	—	—	1	
14	(K)30734830-001	gear assembly, change gear hub 60T, 48DP			1	1	1	1	1	1	
15	(K)30734833-001	gear assembly, change gear hub 28T, 31DP			—	—	1	—	1	1	
	(K)30734832-001	gear 32T, 32DP			—	1	1	—	1	1	
16	30676716-item	change gear (see Table 2)									
17	30007403-000*	external cotter			2	2	2	2	2		
18	(K)30734830-001	latch assembly			1	1	1	1	1	1	
19	30079208-000*	external cotter			1	1	1	1	1		
20	(K)30734830-001	spring torsion			1	1	1	1	1	1	
21	30000005-004*	screw 10-32 phlps. hd. 1/4"			1	1	1	1	1		
22	30004971-000*	washer .195 ID x .420 OD x .036 THK			1	1	1	1	1		
23	30678073-001*	washer .128 ID x .234 OD x .010 THK			1	1	1	1	1		
24	(K)30734830-001	spring			1	1	1	1	1	1	
25	30735598-001	plate assembly			—	—	—	1	1		
26	30679871-001	gear assembly (60T)			—	—	—	1	1		
27	(K)30734830-001	retaining ring			—	—	—	1	1	2	

FIGURE NO. 3 — Right Hand Side Plate

Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity Per						Kit
			10	100	Unit 30676774-						
					001	004	005	006	007		
	30676774-001	RH side plate — one & two pen 111			1						
	30676774-004	RH side plate — one pen 112				1					
	30676774-005	RH side plate — multipoint 112					1				
	30676774-006	RH side plate — mech. multipoint M.P.111						1			
	30676774-007	RH side plate — mech. multipoint M.P.112							1		
1	(K)30734832-001	adjusting plate			1	1	1	1	1	1	
2	(K)30734830-001	guide bushing			1	1	1	—	—	1	
	(K)30734830-001	guide bushing (mech. multipoint)			—	—	—	1	1	1	
3	(K)30734832-001	spring, scale latch			—	—	1	—	—	1	
4	(K)30734831-001	bracket			1	1	—	1	1	1	
5	(K)30734833001	bracket assembly with pulley			1	—	—	1	—	1	
6	(K)30734832-001	bracket assembly with pulley			—	—	1	—	1	1	
7	(K)30734831-001	bracket assembly with pulley			—	1	—	—	—	1	
8	(K)30734831-001	bracket assembly with pulley			1	—	—	—	—	1	
9	30000012-603*	screw 6/32 flat hd. 3/16"			3	4	3	3	3		
10	30000012-605*	screw 6-32 flat hd. 5/16"			3	3	3	3	3		
11	30682654-001	bearing			—	—	—	1	1		
12	30000012-403*	screw 4-40, flat hd. 3/16"			—	—	—	4	4		
13	30735402-001	gear assembly 60T			—	—	—	1	1		
14	(K)30734830-001	retaining ring			—	—	—	1	1	2	
15	(K)30734832-001	nut plate			1	1	1	1	1	1	

FIGURE NO. 4 — Chart Drive Motors

Key No.	Part No.	Description	Recom'd Spare Parts Per		Quantity Per	
			10	100	Unit	Kit
1	30680265-item	2 speed gear box and motor assy. (see Table 3)			1	
2	30000926-000*	lockwasher #6			2	
3	30000080-028*	bolt 10-32 fil. hd. 1-3/4"			1	
4	30000080-020*	bolt 10-32 fil. hd. 1-3/8"			1	
5	30680268-item	gear motor assembly (see Table 3)	1	2	1	
6	(K)30734830-001	spacer plate			1	1
7	30676740-item	motor assembly (hi speed, see Table 5)	1	2	1	
8	30009634-000*	washer .203 ID X .312 OD X .064 THK			2	
9	30000925-000*	lockwasher #10			2	
10	30000006-038*	screw 10-32 rd. hd. 2 3/8"			2	
11	See Table 1 See Table 2	motor assembly (low speed, chart speed change gears)	1	2	1	
12	30000005-603*	screw 6-32 bdg. hd. 3/16"			2	
13	30677496-item	motor assembly (hi speed, Table 4)	1	2	1	
14	30351600-000*	hex nut 4-40			1	
15	30000930-000*	lockwasher #4			1	
16	30000005-404*	screw 4-40 bdg. hd. 1/4"			1	
17	30677498-item	capacitor assembly (see Table 4 & 5)			1	
18	(K)30734830-001	spacer			2	2
19	30000005-807*	screw 8-32 bdg. hd. 7/16"			2	
20	30680263-002	switch assembly, two speed chart drive			1	
21	30682332-002	switch, chart drive 112, single speed (option on one & two pen, standard on multipoint)			1	
22	30000005-805*	screw 8-32, bdg. hd. 5/16"			2	
23	30676832-005	switch, chart drive 111, single speed (option on one & two pen, standard on multipoint)			1	

TABLE 1 (See Note 1)

Chart Drive Motor 120 Volts - Low Speed				Chart Drive Motor 120V 50/60 Hz - Low Speed		
Part No. 60 Hz	Part No. 50 Hz	Chart Speed	RPM	Part No.	Chart Speed	RPM
30752597-001	30752599-001	1"/hr	1/40	30370498-023	1"/hr	1/40
30752597-002	30752599-002	2"/hr	1/20	30370498-024	2"/hr	1/20
30752597-003	30752599-003	6"/hr	3/20	30370498-025	6"/hr	3/20
30752597-004	30752599-004	10"/hr	1/4	30370498-026	10"/hr	1/4
30752597-005	30752599-005	12"/hr	3/10	30370498-027	12"/hr	3/10
30752597-006	30752599-006	20"/hr	1/2	30370498-028	20"/hr	1/2
30752597-007	30752599-007	30"/hr	3/4	30370498-029	30"/hr	3/4
30752597-008	30752599-008	60"/hr	1-1/2	30370498-030	60"/hr	1-1/2
30752597-009	—	4"/hr	1/10			

NOTE 1

Your instrument is equipped with either a 120V/60 Hz, 120V/50 Hz, or a 120V/50-60Hz motor. The part number is stamped on the motor in the instrument. Use this number when ordering.

TABLE 2

Chart Speed Change Gears 120 Volts					Chart Speed Gears 120 Volts 50/60 Hertz			
Use	Gear No.	Teeth	Ratio	Hertz	Use	Gear No.	Teeth	Ratio
	(K)30734834-001	60T	1:1	60	2	(K)30734834-001	60T	1:1
	(K)30734834-001	80T	2:1	60	1	(K)30734834-001	80T	2:1
	(K)30734834-001	40T	or 1:2	60	1	(K)30734834-001	40T	1:2
	(K)30734834-001	45T	1:2	50				
	(K)30734834-001	75T		50				
	(K)30734834-001	84T	2:1	50				
	(K)30734834-001	35T		50				
	(K)30734834-001	66T	1:1	50				
	(K)30734834-001	55T		50				

TABLE 3

2 Speed Gear Box & Motor Assembly (120V / 50/60 Hz)
(See Section 758-) for detail parts of gear box only

Assembly No.	Basic Chart Speed	Jump Speed	Ratio	Gear Box Only	Motor Only	RPM
30680265-021	10"/hr.	1"/hr	10:1	30680266-002	30680268-010	2.5
30680265-020	20"/hr	2"/hr	10:1	30680266-002	30680268-009	5.
30680265-019	60"/hr	6"/hr	10:1	30680266-002	30680268-007	15
30680265-018	120"/hr	12"/hr	10:1	30680266-002	30680268-006	30
30680265-024	30"/hr	0.5"/hr	60:1	30680266-001	30680268-008	7.5
30680265-023	60"/hr	1"/hr	60:1	30680266-001	30680268-007	15
30680265-022	120"/hr	2"/hr	60:1	30680266-001	30680268-006	30

TABLE 4

Chart Drive Motor 120V 50/60 Hz - Hi speed

Part No.	Chart Speed	RPM	Capacitor Assembly
30677496-008	2"/min.	3	30677498-005
30677496-009	4"/min.	6	30677498-005
30677496-010	6"/min.	9	30677498-005
30677496-011	10"/min.	15	30677498-005
30677496-017	12"/min.	18	30677498-005

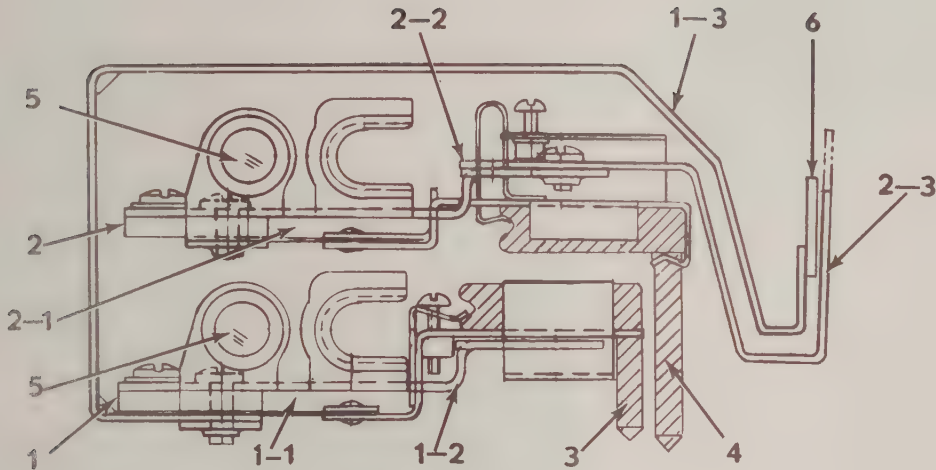
TABLE 5

Chart Drive Motor (Stack Type)
(See Section 759- for detail parts of motor) - Hi speed

Part No.	Chart Speed	Ratio	RPM	Hz	Capacitor Assembly
30376740-015	20"/min.	60:1	30	60	30677498-006
30376740-014	30"/min.	40:1	45	60	30677498-006
30376740-015	20"/min.	60:1	30	50	30677498-007
30376740-014	30"/min.	40:1	45	50	30677498-007

ELECTRONIK 111 & 112
FIBRE TIP INK CARTRIDGE
PEN ASSEMBLY
PARTS LIST

Section 754-30, Issue 3



IMPORTANT

1. An asterisked part number indicates that the described part is commercially available. For your convenience, all commercially available hardware and electrical components have been put in parts kits which can be ordered by part number 30734897-001 (electrical components - 1 each) and 30734892-001 (hardware - 10 each).
2. "(K)" denotes that the part number is for the parts kit in which the described part is included. The described part cannot be ordered separately.

Figure No. 1

Key No.	Part No.	Description	Recom'd Spare Parts Per		Unit	Quantity Kit
			10	100		
1	30733244-001	#1 Pen carriage			1	
	30733244-002	Pen carriage -Dual Range			1	
1-1	(K) +	Pen carriage			1	1
1-2	30733205-001	Pen carrier			1	
1-3	(K) 30734893-001	Bracket and pointer #1 pen			1	1
	30751588-001	Mounting bracket (For Dual Range pointer)			1	
2	30733246-001	#2 pen carriage assembly			1	
	30733246-002	Motor driven set point pen carriage assembly			1	
2-1	(K) +	Pen carriage			1	1
2-2	30733206-001	Carrier #2 pen			1	
2-3	(K) 30734893-002	Bracket and pointer #2 pen			1	1
	(K) 30734893-002	Pointer motor driven set point			1	1
3	30733241-001	#1 pen cartridge-red (pkg. of 4)	2**	—	1	
	30733241-003	#1 pen cartridge-red (pkg of 12)	—	4**	1	
4	30733241-002	#2 pen cartridge-purple (kg of 4)	2**	—	1	
	30733241-004	#2 en cartridge-purple (pkg of 12)	—	4**	1	
5	(K) +	Guide rod class III			1	1
	30682271-001	Guide rod class 112			1	
6	30751584-001	Pointer - Dual range			1	
	30000005-202	Screws bd. hd 0.125 inch			2	
	30006581-000	Lockwashers			2	

** Red and Purple required for two-pen instrument.

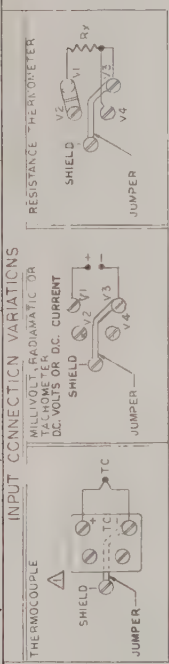
Red only for one-pen or motor driven set point instrument.

† Parts are contained in kits 30734893-001 and kit 30734893-002.

All the reference wiring diagrams, connection drawings and dimension drawings are located beyond this page. Because they are selected specific to the instrument model number which appears on the cover, the drawings, can only be indexed through the sectionalized table of contents pages.

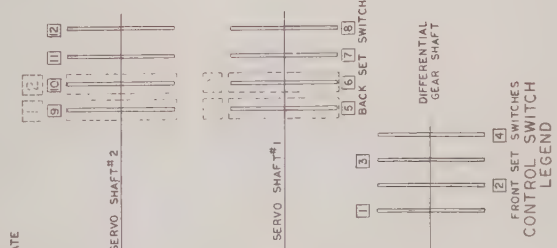
12 11 10 9 8 7 6 5 4 3 2 1

REV	DATE	BY	CHK	APP
1	5-23-68			
2	REVISED 11-5-68			
3	REVISED 11-5-68			
4	REVISED 12-13-68			
5	REVISED 12-17-68			
6	REVISED 12-16-68			
7	REVISED 12-16-68			



TERM NO	INTERNAL FUNCTION	REF DIAGRAM
6	COM BACK SET SW 9	730327
7	NC BACK SET SW 9	730327
8	COM BACK SET SW 10	730327
9	NC BACK SET SW 10	730327
10	COM BACK SET SW 11	730327
11	NC BACK SET SW 11	730327
12	COM BACK SET SW 12	730327
13	NC BACK SET SW 12	730327
14	COM TRANSMITTING SLIDEWIRE WITHOUT TRIMPOTS	730333
15	NC TRANSMITTING SLIDEWIRE WITHOUT TRIMPOTS	730333
16	COM TRANSMITTING SLIDEWIRE WITH TRIMPOTS	730333
17	NC TRANSMITTING SLIDEWIRE WITH TRIMPOTS	730333
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100	COM TRANSMITTING SLIDEWIRE	730333

TERM NO	INTERNAL FUNCTION	REF DIAGRAM
1	ERROR	730331
2	GENERATOR	730331
3	FOR SINGLE SPEED CHART DRIVE	730331
4	EVENT PEN	730331
5	COM FRONT SET SWITCH 3	730327
6	NC FRONT SET SWITCH 3	730327
7	COM FRONT SET SWITCH 4	730327
8	NC FRONT SET SWITCH 4	730327
9	COM FRONT SET SWITCH 5	730327
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14	NC FRONT SET SWITCH 7	730327
15	COM FRONT SET SWITCH 8	730327
16	NC FRONT SET SWITCH 8	730327
17	COM TRANSMITTING SLIDEWIRE WITHOUT TRIMPOTS	730333
18	NC TRANSMITTING SLIDEWIRE WITHOUT TRIMPOTS	730333
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100	NC TRANSMITTING SLIDEWIRE	730333



TERMINALS NOT SHOWN DUE TO WIRING LOCATION

120 VAC POWER MAX OF 25 WATTS FUSED

AND CONTROLLED BY INSTRUMENT POWER SWITCH AVAILABLE AT HOT SW TERMINAL FOR CUSTOMER USE

IF TABLE VII OPTION 152 REMOTE CHART SWITCH SINGLE SPEED IS SPECIFIED, CONNECT 120 VAC HOT THRU SPST SWITCH TO TERMINAL MARKED B.

OPTIONS USING SAME TERMINALS NOT AVAILABLE TOGETHER

OPERATION OF FRONT AND/OR BACK SET SWITCHES

CIRCUIT CONN	CIRCUIT ENERGIZED
BETWEEN TERM	WHEN PV IS
C AND N.O.	BELOW SWITCH SETTING
C AND N.C.	ABOVE SWITCH SETTING
C—SWITCH COMMON	
N.O.—SWITCH CLOSED CONTACT	
N.C.—SWITCH OPEN CONTACT	
VOLTAGE RAT NGS	

REFERENCE DIAGRAMS IN TABLE ARE FOR INTERNAL WIRING ONLY

REFERENCE JUNCTION COMPENSATOR INSTALLED ON INSTRUMENTS WITH THERMOCOUPLE PRIMARY ELEMENTS ONLY

HONEYWELL

CUSTOMER TERMINAL

CONN—TWO SERVO

INSTRUMENT

CLASS III E12

702950

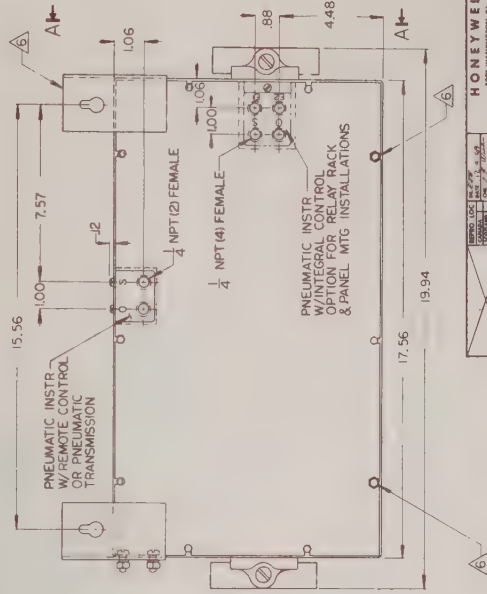
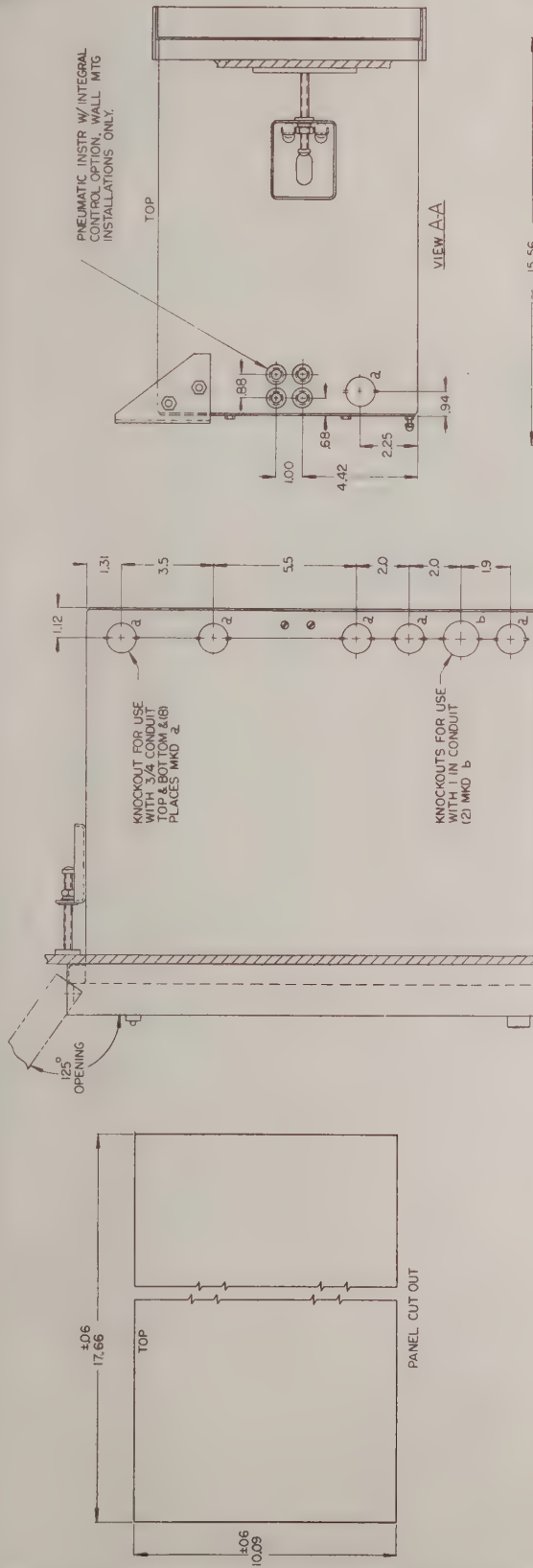
DATE

BY

CHKD BY

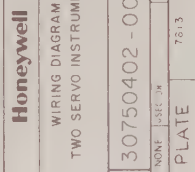
APP'D BY

7965 HM 303

[illegible]

- 1- FOR WALL MTG USE KIT 30677492-001
- 2- INPUT CIRCUITS SHALL BE SEPARATED FROM POWER CONDUIT SYSTEM.
- 3- MINIMUM RECOMMENDED DISTANCE BETWEEN WALLS AND SIDES OF INSTRUMENT 12 IN.
- 4- MINIMUM RECOMMENDED CENTERLINE DISTANCE BETWEEN TWO INSTRUMENTS MOUNTED SIDE BY SIDE 20.8 IN.
- 5- FOR PANEL MTG USE KIT 30595383-000.

7 - ALL DIMENSIONS NOT TOLERANCED ARE REFERENCE.



Technical drawing of a mechanical part, showing a cross-section with a central hole and a rectangular feature. Dimensions are given in inches and millimeters. The drawing includes a top view and a side view.

Top View: A circle with a central hole. The outer diameter is 1.000 (25.400). The inner hole diameter is 0.375 (9.525). The thickness of the part is 0.125 (3.175).

Side View: A rectangle with a height of 0.125 (3.175). The width is 1.000 (25.400).

Dimensions:

- 1.000 (25.400)
- 0.375 (9.525)
- 0.125 (3.175)

Material: 304 STAINLESS STEEL

Finish: POLISHED

DO NOT SCALE DIM

REF 307 30323

THE COPYRIGHT OF THIS DRAWING
IS THE PROPERTY OF HONEYWELL
THE DRAWING IS SUPPLIED IN
CONFIDENCE AND MUST NOT BE
USED FOR ANY PURPOSE OTHER
THAN THAT FOR WHICH IT IS
SUPPLIED

10 20 30 40 50 60 70 80 mm

CP

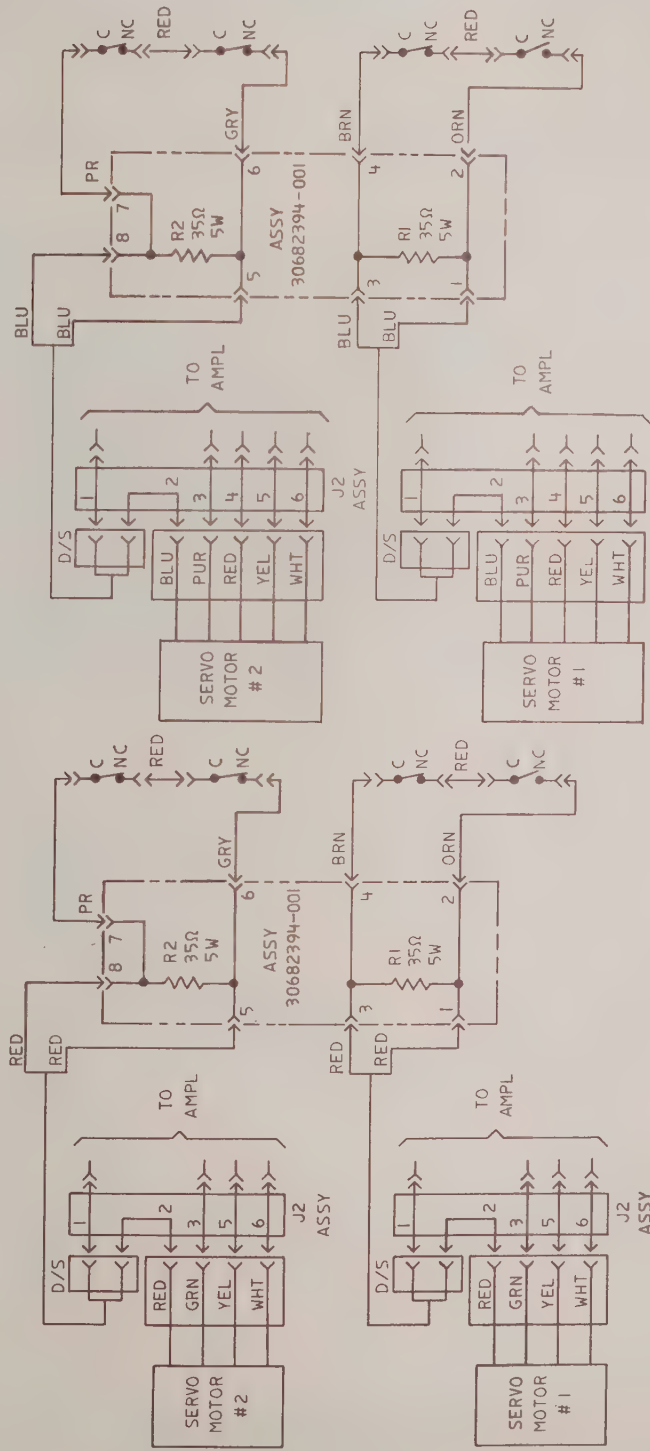
STRUMENT IS SUPPLIED WITHOUT
TABLET (V. OPTION 150) AMPERS
CROSS TERMINALS 25 AND 8

SERVO MOTORS WILL CUT OFF
POWER SWITCH TO HAVE SERVO
OFF WITH EITHER POWER SWITCH
SWITCH MOVE WHITE LEAD OF
MOTOR NO. 1 TO PIN 10 AND WHITE L
MOTOR NO. 2 TO PIN 4

2 WHEN II
POWER
PLACED

1 AS SHOW
WITH PC
MOTORS
OR CHAP
SERVO N
OF SERV
NOTES

N P



CONNECTIONS FOR 4 LEAD SERVO MOTOR

J2
ASSY
CONNECTIONS FOR 5 LEAD
SERVO MOTOR

1. DIAGRAM SHOWS #1 SERVO DESENSITIZED
2 SERVO FULLY POWERED.

NOTES

9-2703 (10/75) OAF

 PROJECTION		 		 		 Honeywell	
LINEAR MEASURE:		mm IN		DRAWN <u>B.R.</u> 6/2/78 CHECKED <u>W</u> 6/78		WIRING DIAGRAM SERVO DESENSITIZING CL III/112	
MATERIAL		DAY, DATE <u>Eck 4/78</u> <u>D.J. 6/78</u>		REF. <u>30709352</u>		30750414-000	
FINISH		TOLERANCE UNLESS NOTED:		C/A2		SCALE <u>1:1</u> USED ON	
ASPECTED DIMENSIONS		DO NOT SCALE DIMS		PLATE		7613 BE	

SERVICE MANUALS covering theory, servicing, and schematics are now available for the following product lines. If you would like one or more, please fill out and fold this form, enclose remittance, seal and mail. The preferred method of handling requests of this type from customers is that they forward a check or money order with their letter or requisition. Without remittance, a minimum billing charge of \$50.00 applies. Applicable sales tax and shipping and handling charges of \$5.00 should be included in the amount of the check, made out to Honeywell Inc.

Book No.	Description	Price Each	Qty.	Totals
11-02-01	Model 111-112 Recorders and Indicators	\$ 16.05		
15-02-01	Model 15 Recorders and Indicators	\$ 18.85		
19-02-01	Model 195, 196 Recorders	\$ 18.85		
37-02-01	Model 37 VutroniK Indicators	\$ 13.00		
37-02-05	Model 37 VutroniK Recorders	\$ 13.00		
45-02-01	Model 452 Servoline Recorder	\$ 13.00		
45-45-13-01	Model 455 Servoline Recorder	\$ 16.50		
80-02-01	Model 805 Solid State Control Units	\$ 10.85		
99-02-01	Models 22, 60, 61, 70 and 71 Meter and Gage Instruments	\$ 14.15		
72-4015	DialaTrol Models built prior to 8/80	\$ 13.00		
45-02-13-07	DialaTrol Models built after 7/80	\$ 20.00		
Sub Total				
Handling Chg.		\$ 5.00		
Sales Tax (where applicable)				
☐ Bill me at address below ☐ Check or money order enclosed for				

Please type or print clearly:

SHIPPING LABEL:

SEND TO:

NAME

ADDRESS

CITY

STATE

ZIP

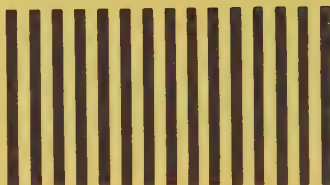
Billing Address:

☐ Same

☐ Shown below



NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES



BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 18 FORT WASHINGTON, PA

POSTAGE WILL BE PAID BY ADDRESSEE

Honeywell

MS 436
Process Control Division
1100 Virginia Drive
Fort Washington, PA 19034

Honeywell Charts

Honeywell charts are specially designed and made exclusively for use with the Honeywell recorder and are calibrated and tested to insure the very best of records. As the owner of Honeywell recorders, you will naturally want to help maintain its high accuracy and sensitivity by using Honeywell charts.

There are two types of charts, circular and strip, and each type and size is available with a wide variety of ranges and calibrations to suit your every need.

Here are the features that make Honeywell charts the highest quality charts available. Along every step of the production line—from the blending of wood pulps to the packaging and shipping of your charts—strict requirements and controls are enforced to guarantee the quality and precision workmanship so necessary to best serve your needs.

Features

COMPOSITION

All Honeywell charts are made from 100% bleached chemical wood pulp, free from groundwood, de-inked stock, or low-grade pulps. This guarantees uniformity throughout.

TRENGTH

Special treatments of all chart papers give the best writing surface; charts are treated for wet strength so that an oscillating pen will not feather or break through.

DIMENSIONAL STABILITY

The expansion or contraction of chart papers will not exceed an average of 1% from 10 to 85% relative humidity change. And we're continually working to reduce this low figure.

CALIBRATION

An electronic computer which calculates the number of graduations, the degrees of thickness of each line marking, and the exact distances between lines, provides the most accurate, uniform charts available.

HUMIDITY COMPENSATION

Standard strip charts have elongated holes on one side. This permits any fractional expansion or contraction of chart, due to changes in humidity, to take place in least-used portion of chart.

SMOOTHNESS

The high-quality pulp, uniform thickness, and expertly controlled calendering of Honeywell chart paper insure a smooth surface that will offer a negligible amount of resistance to the recording pen.

BRIGHTNESS

All Honeywell charts are easy to read because they have a brightness rating of 77 to 87 as measured on a G.E. brightness meter. Your operators can easily see chart graduations, time markings, recording marks, etc.

APPEARANCE

All Honeywell charts are clean, well-formed, and free of dirt particles, slime spots, holes, and similar defects.

SPECIAL PAPER

Charts can be made to order in special colors and special papers (such as Vellum for excellent reproducibility).

PACKAGING

All strip charts are rolled on a cardboard spool that easily fits into position in the recorder. Strip Charts are packaged individually; circular charts 100 to a box. All boxes have adequate space to record dates, etc., and serve as convenient, space saving containers for storing charts after use.

Specifications

STRIP CHARTS

Honeywell Recorder	<i>VumatiK</i> and <i>VutroniK</i>	<i>Model 1113</i>	<i>Model</i>		<i>Models 153 and 1123</i>
			<i>195</i>	<i>196</i>	
Chart Roll Size	4.328"	6.5"	6.5"	11.3"	12"
Calibrated Width	4"	6"	6"	10.433"	11"
Length	53 ft.	122 ft.	122 ft.		122 ft.
Line Color	Beige	Gray	Green		Blue
Number Color	Black	Black	Green		Black
Std. Time Markings	3/4", 1", 1-1/2"	1/2", 1", 2", 4"	10 lines/"		1/2", 1", 2", 4"
Packaged Unit/box	1 roll	1 roll	1 roll		1 roll

CIRCULAR CHARTS

Honeywell Recorder	<i>ElectroniK 1112</i>	RH and Temperature Class 612	Model AR100	Class 60, 70	Class 152, 22, 45, 47, 60 & 70
Chart Diameter	6.5"	8"	10.34"	10"	12"
Calibrated Width	3"	3.268"	100 mm	4.75"	4.75"
Line Color	Beige	Blue	Beige	Blue	Blue
Number Color	Beige	Blue	Beige	Blue	Blue
Packaged Unit/Box	100	100	100	100	100

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